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BRITISH SEA-WEEDS.

BRITISH SEA-WEEDS.

DRAWN FROM

PROFESSOR HARVEY'S "PHYCOLOGIA BRITANNICA."

WITH DESCRIPTIONS,
AN AMATEUR'S SYNOPSIS, RULES FOR LAYING OUT SEA-WEEDS,
AN ORDER FOR ARRANGING THEM IN THE HERBARIUM,
AND AN APPENDIX OF NEW SPECIES.

By MRS. ALFRED GATTY.

VOLUME II.

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1872.

Plate XXXVIII.

Figs. 173 & 174. NITOPHYLLUM PUNCTATUM.

Colour. Bright pink.

Substance. Delicately membranaceous.

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Character of Frond. A thin, flat, ribless expansion; unstalked (*sessile*); irregular in outline, but always inclined to wedge-shaped; variously slit and divided. Sometimes nearly simple, with a few forked (*dichotomous*) divisions (*laciniæ*) above; or fringing the margins also. Sometimes narrow, and repeatedly forked from the base. (See Fig. 174; upper form.) Glossy when dried. Unmarked by veiny lines.

Measurement. From 4 to 12 inches long, and about as broad. At Cushendall, N. Ireland, 5 feet long by 3 wide.

Fructification. Of two kinds. 1. Clustered *spores* in small, globose, *capsules;* immersed in, and thickly scattered over, the surface. 2. *Tetraspores* in large more or less oval groups (*sori*), scattered, or confined to a central portion.

Habitat. Several stations on our coasts. West of Scotland. Finest in Ireland. Attached to algæ in pools at low-water mark, and in deeper water.

Dr. Harvey has here collected under one name several plants which have been accounted species, but which he has satisfied himself agree in certain important distinctive characters. Amateurs may be guided by the bright, light, pink colour, extremely thin substance, glossiness when dry, and entire absence of veiny lines, to a recognition of this plant under its many forms.

Fig. 175. NITOPHYLLUM HILLIÆ.

Colour. A fine rose-red, which turns to orange in fresh water.

Substance. Membranaceous and tender, but thickish. Mrs. Griffiths said, "resembling soft kid-leather."

Character of Frond. A flat, ribless expansion; rising from a short stalk; of round but irregular outline; more or less deeply slit into oblong, broad, rounded divisions (*laciniæ*). Margins smooth and even; or occasionally slightly waved. Obscure veins rising from the base, and sometimes spreading faintly upwards.

Measurement. From 4 to 8 inches long.

Fructification. Of two kinds. 1. Clustered *spores* in large globose *capsules;* immersed in, and scattered over, the surface. 2. *Tetraspores* in extremely minute, dot-like groups (*sori*), scattered over the upper part of the divisions (*laciniæ*).

Habitat. South of England. On the shady sides of deep tidal-pools near low-water mark. Rare.

Fig. 176. NITOPHYLLUM GMELINI.

Colour. Purplish-red.

Substance. Membranaceous; but crisp and somewhat rigid when first gathered.

Character of Frond. A flat, ribless expansion, rising from a short stalk; of broadly fan-shaped or round outline; more or less deeply slit and divided. Divisions (*laciniæ*) broadly wedge-shaped, waved or curled. Margins smooth and even. Obscure veins rising from the base and sometimes spreading faintly upwards.

Measurement. From 2 to 4 inches high, and as wide or wider. In Irish specimens 6 inches.

Fructification. Of two kinds. 1. Clustered *spores* in largish, globose *capsules;* scattered over the surface. 2. *Tetraspores* in long, line-like groups (*sori*) along the margins only.

Habitat. South of England. Plymouth, fine. Ireland. On rocks and large algæ, near low-water mark.

When fresh, always to be recognised by its crisp, rigid substance.

Fig. 177. NITOPHYLLUM LACERATUM.

Colour. Dull-purplish, or brownish-red.

Substance. Membranaceous. Extremely thin; cracking when dry.

Character of Frond. A flat, ribless expansion; unstalked (*sessile*); much slit and divided in a forked manner (*dichotomously*). The divisions (*laciniæ*) sometimes narrow, like those of the narrow variety of *N. punctatum* (see Plate XXXVIII. Fig. 174, the upper form); sometimes as broad as those of *N. Gmelini* (Plate XXXVIII. Fig. 176); generally obtuse; margins either smooth and even or curled; or fringed with small leafy frondlets. Distinctly marked veins rising from the base and spreading upwards.

Measurement. From 2 to 10 inches long.

Fructification. Of two kinds. 1. Clustered *spores* in globose *capsules;* scattered. 2. *Tetraspores* in oblong groups (*sori*) disposed along the margin, or in the fringing leaflets.

Habitat. Our coasts generally. Near low-water mark. Common.

The only *Nitophyllum* which reflects prismatic colours in the water. A variety has all the tips of the divisions turned in like hooks, and clings by them to the small algæ near. For other *Nitophyllums* see Plate XL. Figs. 181 and 185.

Fig. 178. PLOCLAMIUM COCCINEUM.

Colour. Bright pink-red; particularly after a short exposure.

Substance. Elastic, though thin; not easily tearing. Giving out a pleasant scent in fresh water.

Character of Frond. Flat, or nearly so; very narrow; tufted; excessively branched. Main stems irregularly divided; thickly set with alternate, spreading branches, which are furnished throughout with short-curved, pointed branchlets. Branchlets simple, or furnished on their inner face with a smaller set of short-curved, pointed branchlets, arranged four in succession; these sometimes re-branchleted in a similar manner; the compound branchlets resembling little combs. All the frond at one level as if cut out of paper.

Measurement. From 2 to 12 inches long.

Fructification. Of two kinds; external. 1. A mass of minute *spores* in globose *capsules*, unstalked; borne on the edge of the upper branches. 2. *Tetraspores* in minute, simple, or branched *Stichidia;* on the branchlets.

Habitat. Our coasts generally. On rocks and the larger algæ, at low-water mark, or beyond. Common and abundant.

Fig. 179. RHODYMENIA LACINIATA.

Colour. The finest crimson.

Substance. Thickish; soft; elastic though membranaceous.

Character of Frond. A flat ribless expansion; rising from a short flat stem; of more or less fan-shaped outline; deeply slit and divided in a forked manner (*dichotomously*). Divisions (*laciniæ*) wedge-shaped; re-divided in the same way; the tips obtuse; often torn. When in fructification the margins curled or fringed with minute leafy frondlets; these occasionally found on the surface.

Measurement. From 3 to 10 inches long.

Fructification. Of two kinds. 1. A mass of minute *spores* in globose *capsules*, immersed in the fringing or surface leaflets. 2. *Tetraspores* forming cloudy spots on the surface; or along the margins, which are then smooth and entire.

Habitat. Our coasts generally. On rocks and stones, &c. in the sea; rarely within tide-marks.

Now *Callophyllis laciniata.*

Fig. 180. RHODYMENIA PALMETTA.

Colour. Rose-red; darker when dry.

Substance. Membranaceous, except the stems, which are elastic.

Character of Frond. A flat, ribless, fan-shaped, but often repeatedly forked expansion, rising from a longish, first cylindrical, then compressed stem, which is either simple or divided; widening gradually upwards. Tufted. Divisions (*laciniæ*) narrow, with rounded spaces between, and very smooth, flat margins. Root, a broad disc, sometimes accompanied by fibres.

Measurement. Stems from ½ inch to 2 inches long. Fronds 1 or 2 inches.

Fructification. Of two kinds. 1. A mass of minute *spores* in globose prominent *capsules*, seated on the edges of the margins, or scattered; generally towards the tips of the *laciniæ*. 2. *Tetraspores* forming deep red groups (*sori*) in the expanded tips.

Habitat. Our shores generally, but inclining southwards. On rocks, &c. near the verge of low-water mark, and lower. Not uncommon.

Varying greatly in general appearance; but usually tolerably fan-shaped. Sometimes with only a short stem, sometimes with almost none; or sometimes merely forked into two narrow leaves. (See figure.) Its pink-colour, crisp, yet delicate substance, and fructification, must be looked to as guides.

Plate XL.

Fig. 181. NITOPHYLLUM VERSICOLOR.

Colour. When fresh, rose-red; turning to a beautiful golden orange in fresh water; even when wetted by a shower only.

Substance. Thick; membranaceous; soft; all but the stems, which are firmly elastic.

Character of Frond. A flat, ribless expansion, spreading suddenly from the top of a somewhat tuberous stem. General outline round. Slit into several deeply-cut, wedge-shaped divisions. Divisions (*laciniæ*) subdivided; many times slit above; their tips rounded, and generally thickened with hard, wart-like lumps. Margins smooth; or sometimes fringed with minute hair-like frondlets. Unmarked by veiny lines. Root unknown.

Measurement. From 1 to 3 inches high and across.

Fructification. Unknown.

Habitat. Ilfracombe. Youghal. Thrown ashore from deep water. Very rare.

Fig. 182. DELESSERIA RUSCIFOLIA.

Colour. A clear crimson, rather than pink.

Substance. Delicately membranaceous, but somewhat firmer than *D. hypoglossum.*

Character of Frond. Like that of *D. hypoglossum*, composed entirely of leaves growing from leaves; the younger from the midribs of the older. But in *D. ruscifolia*, the leaves are oblong with obtuse tips; and do not taper at the base.

Measurement. Seldom more than 2 inches high.

Fructification. Of two kinds. 1. A mass of *spores* in globose *capsules;* imbedded in, but prominent upon, the midribs of the leaves. 2. *Tetraspores* in groups (*sori*), forming oblong lines on each side the midribs.

Habitat. Our coasts generally. On rocks near low-water mark; or occasionally on algæ. Not common.

For other *Delesserias* refer back to Plate XXXIII. Fig. 150, and Plate XXXVII.

Fig. 183. RHODYMENIA BIFIDA.

Colour. A delicate rose-red or pink; sometimes dingy.

Substance. Delicately membranaceous; generally transparent.

Character of Frond. A flat, ribless expansion, deeply and repeatedly divided from the base. General outline round. Divisions (*laciniæ*) ribbon-like or wedge-shaped; many times forked (*dichotomous*); their *axils* rounded. Margins sometimes smooth (*entire*); sometimes fringed with minute, leafy, or hair-like frondlets; tips blunt or rounded.

Measurement. From 3 to 10 inches long. Width varying.

Fructification. Of two kinds. 1. A mass of *spores* in globose *capsules;* external; seated (*sessile*) on the margins; or rarely over the surface of the upper divisions. 2. *Tetraspores* forming cloudy spots in the upper divisions.

Habitat. Our coasts generally. On rocks and algæ at low-water mark, or beyond. Frequent.

Now *Rhodophyllis bifida.* The marginal capsules are a great clue to this plant.

Fig. 184. RHODYMENIA CRISTATA.

Colour. A rose-red; becoming scarlet in fresh water.

Substance. Membranaceous.

Character of Frond. Flat; narrow; ribless; repeatedly divided in a forked manner from the base. General outline fan-shaped or round (the figure fails to give this.) Divisions widening upwards; many times sub-divided; lesser ones alternate, occasionally jagged at the ends.

Measurement. British specimens rarely above an inch high.

Fructification. Of two kinds. 1. A mass of *spores* in little spherical dark-red *capsules*, half the size of poppy-seed; imbedded in the upper margins. 2. *Tetraspores* imbedded in the thickened and darkened tips.

Habitat. Orkney and Shetland Islands. Frith of Forth. Berwick-upon-Tweed, and a few more places in the north. Thrown ashore; sometimes on the stems of *Lam. digitata.* Very rare indeed.

Now *Euthora cristata.* Six specimens were found at Berwick in 1853.

Fig. 185. NITOPHYLLUM BONNEMAISONIA.

Colour. Bright rose-red.

Substance. Delicately membranaceous. Very thin.

Character of Frond. A flat, ribless expansion, rising from a short stalk; slit and deeply divided. General outline fan-shaped or round. Divisions broadly wedge-shaped; about equal in length; overlapping each other. Veins rising from the base, and spreading faintly upwards.

Measurement. From 2 to 4 inches high, and about as broad.

Fructification. Of two kinds. 1. A mass of *spores* in largish round *capsules*, scattered over the surface. 2. *Tetraspores* in roundish groups (*sori*); scattered over the surface.

Habitat. Orkney, Bute, Ilfracombe, Torquay, Miltown Malbay, &c. On the stems of *Lam. digitata.* Rare.

Fig. 186. GRATELOUPIA FILICINA.

Colour. Dull pinkish-purple; discolouring green.

Substance. Membranaceous.

Character of Frond. Flat; narrow; tufted; wavily branched. Stems simple or once forked; tapering to each end; naked at base; above, set with long, opposite or alternate, wide-spreading, wavy, flat branches. Branches either simple or clothed in the upper part with branchlets; all tapering to each end.

Measurement. British specimens seldom more than 2 inches high.

Fructification. Of two kinds. 1. *Spores* in minute globular *capsules;* immersed in the substance of the branches. 2. *Tetraspores* imbedded in the branchlets.

Habitat. South of England. On submarine rocks at half-tide level; frequently where a small streamlet runs into the sea. Very rare.

Very like some forms of *Gelidium corneum;* but much softer.

PLATE XLI.

Fig. 187. RHODYMENIA CILIATA.

Colour. A deep, full, more or less bright red; becoming darker in drying.

Substance. Thick; firm; elastic; quite crisp when fresh.

Character of Frond. A flat, ribless, leafy expansion; rising from a very short stalk; more or less broadly lanceolate, or once forked. Margins toothed; or fringed with small, hair-like frondlets, some of which expand into leafy, lanceolate, or once-forked formations like the first; while in others, both on the margin and surface, the capsular fruit is formed. Root fibrous. Fruiting in winter.

Measurement. From 2 to 8 inches long; width of leaves varying from $\frac{1}{8}$ to $1\frac{1}{2}$ inches!

Fructification. Of two kinds. 1. A mass of *spores* in globose *capsules*, formed in the hair-like frondlets. 2. *Tetraspores* forming cloud-like patches; dispersed over the surface.

Habitat. Our shores generally, except the extreme north-east. At Bridlington, but not at Filey. On rocks, &c. near low-water mark, and beyond. Frequent.

Now *Calliblepharis ciliata.* The tips of the hair-like frondlets in which the capsules form are turned aside by the swelling, and project sideways, like the bill of a bird. (See figure.)

Fig. 188. RHODYMENIA JUBATA.

Colour. A dull purplish, or pinkish-red.

Substance. Thick; soft; elastic; limp.

Character of Frond. A flat, ribless, leafy expansion; rising from a cylindrical stem; narrow-lanceolate; tapering to the base; branched with leafy formations of the same character; or sometimes with thread-shaped, fibre-like tendrils which spring both from the surface and margins; fringed (like *R. ciliata*) with lesser hair-like frondlets, in which the fruit of both kinds is produced. Root fibrous. Fruiting in summer.

Measurement. From 1 to 8 inches long. Width varying almost incredibly.

Fructification. Of two kinds. 1. A mass of *spores* in hemi-spherical *capsules*, seated (*sessile*) on the fringing frondlets. 2. *Tetraspores* immersed in the same.

Habitat. South and west coasts. On the bottoms of tide-pools between tide-marks; chiefly near low-water mark or among the roots of *L. digitata.* Frequent.

So various in width and size that it is very difficult to describe. Sometimes "filiform and entangled," and resembling *Gigartina acicularis.*

Figs. 189 & 190. RHODYMENIA PALMATA.

Colour. A dull purplish, or brownish-red.

Substance. When young, membranaceous; afterwards leathery.

Character of Frond. A flat, ribless, broadly wedge-shaped expansion, much and irregularly divided into numerous, jagged, branching divisions; or else repeatedly branched in a forked manner (*dichotomously*). Margins smooth (entire), or fringed with leaf-like formations. Root a disc.

Measurement. From 2 to 20 inches long.

Fructification. Only one kind known. *Tetraspores* forming cloud-like patches; dispersed over the surface.

Habitat. Our coasts everywhere. On rocks and the stems of *Lam. digitata*, &c. Very common.

Fig. 189 represents the commonest form. In Fig. 190 we have, in the narrower specimen, Var. β. *Sarniensis;* in the broader, Var. γ. *sobolifera.* And many intermediate varieties occur. Dr. Harvey assures us, that once seen and *tasted*, no one can fail to recognise *R. palmata* again. It is the *Dulse* of the Scotch; the *Dillisk* of the Irish; and is eaten either raw or cooked, in many places, by the country people. At Miltown Malbay (W. Ireland), and elsewhere, they boil or stew it with a little dripping or butter, and pepper, into a savoury mess, like stewed cabbage.

PLATE XLII.

Fig. 191. SPHÆROCOCCUS CORONOPIFOLIUS.

Colour. A fine scarlet-red; darker in the main stems.

Substance. Gristly; the stems very strong; horny when dry.

Character of Frond. Compressed; narrow; very much branched; wide-spreading, forming a rounded outline. Main stems thickened in the centre; repeatedly divided, with a mixture of forked (*dichotomous*) and alternate branching. Branches several times re-branched in the same irregular way; the margins of the upper ones generally fringed with minute, short, stalk-like, horizontally-set frondlets, in some of which the capsular fruit is formed. Last branchlets much and closely divided; spreading; with acute tips.

Measurement. From 6 to 12 inches long, or more.

Fructification. Only one kind known. A mass of *spores* in globose *capsules,* formed in the fringing frondlets; the swelling turning the tips aside as in *Rhodymenia ciliata.*

Habitat. Southern and western shores of Great Britain and Ireland. Niton Bay, Isle of Wight, abundant. Isle of Man. Isle of Bute.

Fig. 192. GELIDIUM CARTILAGINEUM.

Colour. A fine dark-purple; becoming scarlet, orange, yellow, and finally greenish on exposure.

Substance. Gristly and strong; horny when dry.

Character of Frond. Tufts of very long, narrow, even stems; furnished with long, narrow, regularly alternate branches; these re-branched with a second series; these again with a third; the series diminishing gradually in length; all at one level, like the plumes of a feather (*pinnate*); each branch lanceolate in general outline. Root fibrous.

Measurement. From 12 to 18 inches long.

Fructification. Only one kind known. A mass of *spores* in oval *capsules,* imbedded in the centre of the last branchlets, their tips protruding beyond.

Habitat. Found on the shore at Freshwater Bay; also at Ryde, but not a native plant.

A native of the Cape of Good Hope, and probably only accidentally brought to our coasts. For another *Gelidium* see Plate XLIV. Fig. 199.

Fig. 193. GRACILARIA COMPRESSA.

Colour. A transparent dull red; becoming brighter in fresh water.

Substance. Very tender and brittle; succulent; somewhat gelatinous.

Character of Frond. Tufts of cylindrical, or somewhat compressed stems, which are either undivided and alternately branched from the base, or partly forked at first; alternately branched afterwards. Branches long, and mostly simple; tapering to a fine point; occasionally furnished with branchlets.

Measurement. From 6 to 12 inches long.

Fructification. Of two kinds. 1. A mass of *spores* in almost conical *capsules*; external; *sessile* on the branches. 2. *Tetraspores* minute; imbedded in the same.

Habitat. South of England. Cast ashore from deep water. Very rare.

Fig. 194. GIGARTINA MAMILLOSA.

Colour. A dark purple.

Substance. Gristly; tough; elastic.

Character of Frond. Tufts of, first cylindrical, then flat stems, becoming channelled or grooved upwards, and widening into wedge-shaped, irregularly forked (*dichotomous*) divisions, or branches. Divisions channelled; more or less broadly wedge-shaped; often forked at the tips; the angles acute; their surface and margins dotted over with minute, short, thick, stalked frondlets, in which the capsular fruit is formed.

Measurement. From 3 to 6 inches high. Width of the divisions varying greatly in different specimens.

Fructification. Only one kind observed. A mass of *spores* in globose *capsules;* formed on the frondlets.

Habitat. Our coasts generally. On rocks, &c. near low-water mark. Common.

For other *Gigartinas* see Plate XLIII. Fig. 197; Plate XLIV. Fig. 201; and Plate L. Fig. 225.

PLATE XLIII.

Fig. 194. CYSTOCLONIUM PURPURASCENS.

Colour. A dull, purplish-red; becoming redder in fresh water; pinky towards the tips.

Substance. When fresh, thick; fleshy; semi-transparent and very brittle. When dry, becoming tough, and shrinking considerably.

Character of Frond. Thread-shaped (*filiform*), long, bushy, excessively branched. Stem generally undivided; bearing long alternate spreading branches tapering to each end. Branches either simple or forked, bearing a second and third set of similar character. Branchlets many times divided (almost in tufts), scattered both on stem and branches; with very acute tips. Root fibrous.

Measurement. From 6 inches to 2 feet long.

Fructification. Of two kinds. 1. A mass of *spores* in globose *capsules;* formed in the branchlets; swelling them out. 2. *Tetraspores* imbedded in the lesser branches.

Habitat. Our coasts generally. On rocks, stones, and algæ. Between tide-marks. Very common.

> Collectors will do well to accustom themselves to the new name of this plant, *Cystoclonium purpurascens,* as Dr. Harvey has no hesitation in declaring that it was erroneously placed among the *Hypneas.* The name *Hypnea* is accordingly dropped altogether.

Fig. 196. GRACILARIA MULTIPARTITA.

Colour. A dull purplish-red; becoming redder in fresh water; pinky towards the tips.

Substance. When fresh, thick; fleshy; semi-transparent and very brittle. When dry, becoming tough, and shrinking considerably.

Character of Frond. Flat; narrow; repeatedly but irregularly forked or divided, from the base; at one level, as if cut out. Divisions (*laciniæ*) narrow-wedge shape; their tips acute.

Measurement. From 4 to 12 inches long.

Fructification. Of two kinds. 1. A mass of *spores* in conical, very prominent *capsules;* external; *sessile* on the surface of the frond-divisions. 2. *Tetraspores* imbedded in the same.

Habitat. South coast of England. On rocks, &c. in deep water. Very rare.

Fig. 197. GIGARTINA PISTILLATA.

Colour. A dull purple, becoming darker in drying.

Substance. Gristly when fresh; horny when dry.

Character of Frond. Compressed, simple, narrow-wedge-shaped stems, spreading into branches right and left above, in a repeatedly forked manner (*dichotomously*); forming a broadly fan-shaped outline. Angles of branching (*axils*) wide and rounded; tips acute. Branches naked, or clothed with short horizontal, simple or forked branchlets, on which the capsular fruit is borne. Fruiting in winter.

Measurement. From 3 to 6 inches long.

Fructification. Of two kinds. 1. A mass of *spores* in large spherical *capsules*, depressed in the centre; no darker than the frond; external; *sessile* on the branchlets, either singly or in pairs. 2. *Tetraspores* in groups (*sori*) immersed in the branches; distorting them.

Habitat. Coast of Cornwall. Jersey. On rocks near low-water mark. Very rare.

For another *Gigartina*, see next Plate.

Fig. 198. GRACILARIA CONFERVOIDES.

Colour. A pale or deep red; becoming paler in decay.

Substance. Rigid; gristly; not adhering to paper.

Character of Frond. Long; thread-shaped (*filiform*); solid; irregularly (often very slightly) branched. Branches long and simple, or here and there forked; either naked, or furnished with a few short branchlets. Branchlets tapering to each end.

Measurement. From 3 to 20 inches long.

Fructification. Of two kinds. 1. A mass of *spores* in globose *capsules;* external; *sessile* on the branches; abundant. 2. *Tetraspores;* minute; imbedded in the same.

Habitat. Our shores generally. On rocks and stones in the sea near low-water mark. Not uncommon.

Varying very much in length and the amount of branching. Var. β. *procerrima* has its branches "very long, generally simple, and almost naked." Var. γ. *albida* is compressed instead of thread-shaped, and several times forked, with awl-shaped branchlets. Var. δ. *geniculata* is distorted and bent, as if broken, where the capsules occur.

PLATE XLIV.

Fig. 199. GELIDIUM CORNEUM.

Colour. Dull purplish-red, becoming pink and yellow on exposure, or in fresh water.

Substance. Between gristly and horny; polished.

Character of Frond. Flat or thread-shaped (*filiform*), very narrow, stiff; formally branched; the whole at one level, as if cut out. Stems one width throughout; alternately branched; set with short, simple, wide-spread branchlets. Branches tapering to both ends; re-branched once or twice, exactly in the same manner as the stems. Branchlets mostly opposite, almost horizontally set, always tapering to the base; blunt at the tips, in which the capsular fruit is formed.

Measurement. From 1 to 8 inches high.

Fructification. Of two kinds. 1. A mass of *spores* in oval *capsules*, formed in the tips of the branchlets. 2. *Tetraspores* immersed in the same.

Habitat. Our coasts generally, but shy of the north-east, except the slender, thread-like variety, *G. crinale*. On rocks between tide-marks. Very common.

Fig. 200. GYMNOGONGRUS GRIFFITHSIÆ.

Colour. A dull purplish-red, fading to yellow on exposure.

Substance. Gristly when fresh; horny when dry.

Character of Frond. Entangled tufts of slender, wiry threads; repeatedly forked (*dichotomous*); the tips of one length; forming a round outline. Branches wavy; of one thickness throughout. Angles of branching (*axils*) wide and rounded. Divisions often much crowded above.

Measurement. From 2 to 4 inches high.

Fructification. Only one kind known. *Tetraspores* forming oblong, wart-like swellings, which by degrees surround the stem. (See figure.)

Habitat. Devonshire. Bantry Bay. Orkney. Isle of Man. On rocks near low-water mark. Not very common.

For another *Gymnogongrus* see Plate XLVI. Fig. 211.

Fig. 201. GIGARTINA TEEDII.

Colour. Purplish; brighter in fresh water; fading to purplish-pink.

Substance. Membranaceous, but firm; limp when fresh; horny when dry.

Character of Frond. Flat; narrow; formally branched; at one level, as if cut out (*distichous*). Stems either simple or once forked; set with long, horizontally spread branches, tapering to each end, finely pointed; once or twice re-branched in the same way. Branchlets slender, tapering; the ends often very much drawn out; last set short, thorn-like; finely pointed; horizontal.

Measurement. From 2 to 5 inches long.

Fructification. A mass of *spores* in globose *capsules;* sessile on the last set of branchlets. *Tetraspores* immersed in the same.

Habitat. Elberry Cove, Torbay.

Fig. 202. CHONDRUS CRISPUS.

Colour. Lurid purple in deep water, giving out rainbow-tints; greenish or yellowish in shallow pools near high-water mark; fading to actual white.

Substance. Thickish and firmly elastic; horny when dry.

Character of Frond. Flat; repeatedly forked (*dichotomous*); spreading from a stem which is taper at base; narrow-wedge shape upwards. Outline fan-shaped or round. Divisions wedge-shaped; flat or curled; sometimes very narrow; sometimes very wide; often profuse and spreading; overlapping each other; angles of branching (*axils*), rounded; tips obtuse, and commonly forked. Margins sometimes fringed with frondlets. Root a disc.

Measurement. From 2 to 10 inches high.

Fructification. Of three kinds. 1. Masses of minute *spores* in prominent, oval *capsules;* immersed in the lesser frond-divisions. Rare. 2. *Tetraspores* in large oval groups (*sori*), scattered all over the surface; often prominent to one side only. Common. 3. Prominent *warts*, composed of radiating threads; imperfectly understood.

Habitat. All our rocky coasts. Finest in deep water. Very common.

So variable in appearance that no description will suit all the forms. This is the plant sold as "Carrigeen," or Irish Moss. When boiled down to a jelly it is good for coughs and general weakness; excellent also for fattening cattle. It contains a large per-centage of nitrogen.

Fig. 203. CHONDRUS NORVEGICUS.

Colour. A deep, dull blood-red; or morone.

Substance. Firm and elastic; thinner than in *Chondrus crispus.*

Character of Frond. Flat; narrow; repeatedly forked (*dichotomous*); spreading from a short cylindrical stem. Outline fan-shaped or round. Divisions widening a little, but not much, upwards; angles of branching (*axils*) wide-spread; tips rounded.

Measurement. From 2 to 3 inches high.

Fructification. Of two kinds. 1. Minute *spores* in tiny *capsules*, imbedded in the substance of the frond, slightly prominent to both surfaces. 2. *Tetraspores* collected into round groups (*sori*); scattered on both surfaces, prominent.

Habitat. The warmer southern and western stations on our coasts. On rocks near low-water mark. Fine at Miltown Malbay. Saltcoats; Dr. Lansborough. Rather rare.

Now *Gymnogongrus Norvegicus.* Preferring warm to cold latitudes; so that the name is an unlucky one.

Fig. 204. CATENELLA OPUNTIA.

Colour. Dark, dull purple.

Substance. Membranaceous. Tender and soft; more or less full of moisture.

Character of Frond. Densely tufted; rising from creeping fibres; semi-tubular; constricted at intervals, as if jointed; resembling the Indian fig (*Cactus Opuntia*) in miniature; irregularly branched from the constrictions.

Measurement. From $\frac{1}{2}$ to an inch high.

Fructification. Of two kinds. 1. Masses of *spores* in broadly-oval *capsules*, formed in one of the lesser branchlets. 2. *Tetraspores* immersed in the same.

Habitat. Our coasts generally. On rocks near high-water mark. Common.

PLATE XLV.

Fig. 205. PHYLLOPHORA RUBENS.

Colour. A fine deep red.

Substance. Stiff; rigid; though membranaceous.

Character of Frond. Flat, leafy, narrow wedge-shaped; forked or simple; obscurely midribbed at base; throwing out secondary shoots of the same formation from the upper surface; this second set throwing out a third in the same way; and so on. The surfaces obstinately crumpled; often covered with parasites. Tufted.

Measurement. From 1 to 8 inches long.

Fructification. Of two kinds. 1. A mass of *spores* in minute, roundish, wrinkled *capsules;* seattered on the surface. 2. *Tetraspores* in *warts,* formed at the base of small, leafy, scattered frondlets.

Habitat. Our rocky shores generally; but preferring the warmer stations. Under shelter of rocks near low-water mark. Frequent.

Very handsome when not infested by Melobesias and Zoophytes; but always a rather unmanageable plant to lay out, and never adhering to paper.

Fig. 206. PHYLLOPHORA MEMBRANIFOLIA.

Colour. Purple, or purplish-red; fading to green and yellow.

Substance. Stems gristly; frondlets membranaceous, but rigidly so; especially when old.

Character of Frond. Cylindrical, irregularly divided stems, bearing irregular branches, all of which expand into flat, fan-like, or wedge-shaped frondlets, more or less divided and forked. Margins sometimes smooth; sometimes jagged with tiny leaflets; especially above. Tufted.

Measurement. From 3 to 12 inches long.

Fructification. Of two kinds. 1. A mass of *spores* in egg-shaped *capsules* on short stalks, fringing the stems. 2. *Tetraspores* collected into large, dark, heart-shaped groups (*sori*), in the lower half of the frondlets.

Habitat. Our rocky shores generally; but preferring the warmer stations. On rocks between tide-marks. Frequent.

Fig. 207. PHYLLOPHORA BRODIÆI.

Colour. A bright, clear, pinky-red.

Substance. Delicately membranaceous, but rigid. Stems elastic.

Character of Frond. Cylindrical stems becoming flat and narrow wedge-shaped, or oblong, upwards; forked or simple; throwing out frondlets from their upper margin. Frondlets at first cylindrical; soon expanding into oblong or wedge-shape; simple or forked, throwing out secondary frondlets from their tips. This second set throwing out a third in the same way, and so on.

Measurement. From 1 to 8 inches long.

Fructification. Of two kinds. 1. A mass of *spores* in globose *capsules, sessile* on the tips of the frondlets. 2. *Tetraspores* formed in *warts,* of nearly the same size as the *capsules,* but stalked.

Habitat. Eastern coast of Scotland. Belfast Bay. On rocks in the sea. Rare.

For another *Phyllophora,* see Plate L. Fig. 228, to which the *smaller* form in the present figure (207) refers. *Phyllophora palmettoides* is a subdivision of plants which were once classed together under *P. Brodiœi;* and the dark *sorus* here figured is peculiar to *P. palmettoides.*

Fig. 208. FURCELLARIA FASTIGIATA.

Colour. Brownish-purple; often nearly black when picked up, and becoming so on drying.

Substance. Solid; strong; opaque; elastic, but fleshy.

Character of Frond. Cylindrical, smooth; repeatedly forked, from a short taper stem; thicker above than below; the forkings long and narrow, all the angles of branching (*axils*) being acute. Root a mass of fibres. Fruiting in winter.

Measurement. From 6 to 12 inches long.

Fructification. Of two kinds. 1. Masses of *spores* (*favellæ*) imbedded in the swollen upper forkings. 2. *Tetraspores* deeply imbedded in the same.

Habitat. Our coasts generally. On rocks within tide-marks. Common.

When in fruit the upper divisions are swollen into a lanceolate pod-like form; somewhat flattened in shape.

Fig. 209. DUMONTIA FILIFORMIS.

Colour. Dull purple; fading to green and yellow.

Substance. Gelatinous; membranaceous; tender; very slippery to the touch.

Character of Frond. A simple stem, finely drawn out and tapering to each end (*attenuated*); furnished with long, simple, alternate branches, *attenuated* in the same manner. Both stem and branches cylindrical and tubular; filled with a watery jelly.

Measurement. Stem sometimes from 8 to 18 inches long, with branches from 4 to 5. In other specimens the stem is very short (from 2 to 3 inches); and the branches from 10 to 14. In others there is scarcely any stem at all. In others the whole plant is small and thead-like (*filamentous*).

Fructification. Of two kinds. 1. Roundish masses of *spores* (*favellæ*) immersed in the substance of the frond. 2. *Tetraspores* imbedded beneath the same; seattered over the branches. Visible like dark dots through.

Habitat. Our coasts generally. On rocks, &c. at half-tide level. Common.

Fig. 210. NEMALEON MULTIFIDUM.

Colour. Dull purple, or purplish-brown.

Substance. Gelatinous; solid; very elastic; firm.

Character of Frond. Cylindrical, about the thickness of a crow's quill; once or twice forked, distantly; or simple; or irregularly, slightly branched. Axils rounded and clumsy.

Measurement. From 3 to 6 inches long.

Fructification. Only one kind known. Globular masses of *spores* attached to the filaments which form the outer layer of the frond. Visible like dark dots through.

Habitat. Our coasts generally in the warmer stations. Common along the western shores of Scotland and Ireland. On rocks and shells near low-water mark in exposed situations. Not unfrequent.

Fig. 211. GYMNOGONGRUS PLICATUS.

Colour. Dark-purple; fading to pinky and white.

Substance. Remarkably horny and stiff.

Character of Frond. Like fine wire; of one thickness throughout. Cylindrical; slender; entangled; often in large bundles; very irregularly branched; partly forked (*dichotomous*), partly alternately or *secund* (two or three branches on one side in succession); more or less furnished with short branchlets, horizontally set, and sometimes spreading in all directions. All the angles of branching (*axils*) rounded.

Measurement. From 4 to 10 inches long.

Fructification. Only one kind found; and that imperfectly understood. Oblong warts embracing the stem, composed of very slender, jointed radiating threads.

Habitat. Our rocky shores generally. On rocks between tide-marks, and at a greater depth. Common.

Now *Ahnfeldtia plicata.* For another *Gymnogongrus,* see Plate XLIV. Fig. 200.

Fig. 212. POLYIDES ROTUNDUS.

Colour. Brownish-purple; becoming much darker in drying.

Substance. Between gristly and fleshy; solid; elastic.

Character of Frond. Cylindrical; of one thickness throughout (about that of whipcord); repeatedly forked (*dichotomous*); the tips cut to one level, forming a rounded outline; the last forkings short; angles of division (*axils*) rounded. Tufted. Root a wide-spread disc.

Measurement. From 4 to 6 inches high.

Fructification. Of two kinds. 1. Clustered groups of *spores,* nestling among threads, in large oblong, but irregular, spongy warts, which are pink when fresh; external; embracing the stems. 2. *Tetraspores* deeply imbedded in swollen upper branchlets.

Habitat. Our coasts generally. On rocks and stones between tide-marks. Common.

Very like *Furcellaria fastigiata.* Distinguishable, however, by its disc root; and its spongy parts of fructification when these are present. Otherwise by its *rounded* axils and the shortness of the last forkings.

PLATE XLVII.

Fig. 213. KALLYMENIA DUBYI.

Colour. A dull red; becoming pale and yellow when old.

Substance. Fleshy-membranaceous; feeling like soft, wet kid-leather.

Character of Frond. A flat, ribless, leafy expansion, rising wedge-wise, from a very short, compressed stem. Outline pear or wedge-shaped. At first quite simple; afterwards apt to be torn and divided; probably by the waves. Margins sometimes wavy. Root a disc.

Measurement. From 6 to 12 inches long.

Fructification. Only one kind observed. Round clusters of *spores* half-immersed in, and scattered over, the frond.

Habitat. South of England, and west and south of Ireland; Scilly. On rocks and stones between tide-marks in land-locked bays. Not common.

Now *Schizymenia Dubyi.*

Fig. 214. IRIDÆA EDULIS.

Colour. A fine deep red; becoming dark when dry.

Substance. Fleshy; gristly; almost leathery; firmly elastic.

Character of Frond. A flat, ribless, leafy expansion, rising gradually from a short, taper stem. Several from one root. Outline pear-shaped. Always quite simple, but often torn by the waves, as well as eaten into holes by sea-worms. Margins smooth and even. Root a large, expanded disc.

Measurement. From 4 to 18 inches long; from 2 to 8 wide.

Fructification. Of two kinds. 1. Round clusters of *spores* half immersed in, and scattered over, the frond. 2. *Tetraspores* in oblong groups (*sori*) also immersed and scattered. Both showing like dark spots when the plant is held up to the light.

Habitat. Our coasts generally, near low-water mark, and beyond. Common.

Now *Schizymenia edulis.*

Fig. 215. KALLYMENIA RENIFORMIS.

Colour. A fine, deep crimson.

Substance. Fleshy-membranaceous. Soft and thickish when fresh; becoming thinner in drying. Stems gristly.

Character of Frond. Roundish or kidney-shaped (broader than long) expansions, suddenly spreading from a very short, cylindrical, simple, or branched stem. Expansions very irregular in shape and size; either quite simple or bearing along their margin frondlets of a similar character, and often bigger than the original one. Margins smooth, except when torn; rarely waved. Root a disc.

Measurement. From 1 to even 14 inches in diameter.

Fructification. Of two kinds. 1. Round clusters of *spores* half immersed in, and scattered over the frond. 2. *Tetraspores* very minute; imbedded in the same. Fruiting in winter.

Habitat. The warmer stations on our coasts. Isle of Wight; Scilly Isles; &c. The Orkney Islands (probably owing to Gulf-stream influence). Kilkee. In deep shady pools at extreme low-water mark. Rare.

The small form (*K. microphylla* of Agardh), exactly corresponding to the figure in English botany, is frequently cast ashore in winter-time, in Niton Bay, Isle of Wight. In this variety, the sturdy little stems generally give out several fronds; and the spore-groups are very large in proportion to the size of the plant. Two small lobes in the upper part of the present figure represent this. The larger sort needs more Gulf-stream warmth than the Isle of Wight can boast of. Specimens from Kilkee would make a dozen of the Niton winter variety.

Plate XLVIII.

Fig. 216. HALYMENIA LIGULATA.

Colour. In the three chief varieties, as follows; *dichotoma*, a clear pinky red; *ramentacea*, paler; *latifolia*, dark red.

Substance. Membranaceous and gelatinous. *Ramentacea*, very thin.

Character of Frond. So variable that the varieties are classed into three sorts, as follows:—1. *Dichotoma;* compressed, narrow; often, though irregularly forked; the divisions of nearly equal width; tapering to both extremities. 2. *Ramentacea;* compressed or nearly cylindrical; full of gelantine; divided into three or four principal portions (*lobes*); tapering to both ends. 3. *Latifolia;* flat; wedge-shaped; either simple or forked; or cleft into finger-like portions (*lobes*). All three sorts have their margins more or less fringed with frondlets; *latifolia* least. Root a disc.

Measurement. *Dichotoma* from 6 to 8 inches long; *ramentacea* from 12 to 14 long and from ½ to an inch in width; *latifolia* from 12 to 20 inches long, and from 2 to 4 wide in the widest part.

Fructification. Only one kind known. Minute masses of spores, immersed in, and scattered profusely about the surface, as if it had been dusted with grains of Cayenne pepper.

Habitat. Southern shores of England. On rocks near low-water mark. Rare.

Variable as this plant is in growth, its "pinky colour, peculiarly soft substance, between gelantinous and membranaceous, and the innumerable dots of fructification, are found in every specimen and sufficiently mark the species." Harvey.

Fig. 217. NEMALEON PURPUREUM.

Colour. A fine purple red which is given out in fresh water.

Substance. Tender and gelatinous; slippery to the touch.

Character of Frond. Long, cylindrical stems and branches. Stem as thick as a goose-quill; properly tapering to both ends, but the tip sometimes broken, and throwing out several lesser shoots; set with long, wide-spread, wavy, worm-like branches. Branches simple or furnished with a second set, of much reduced size; all tapering when not broken. A few slender branchlets scattered irregularly over stem and branches. Root a disc.

Measurement. From ½ a foot to 2½ feet long.

Fructification. Only one kind known. Roundish masses of *spores* sunk among the filaments which form the outer layer of the frond.

Habitat. South of England and west of Ireland. In sandy places among *Zostra*, near low-water mark. Rare.

Now *Helminthocladia purpurea.*

Fig. 218. NACCARIA WIGGII.

Colour. A delicate, bright rose-red.

Substance. Tender and gelatinous; adhering closely to paper.

Character of Frond. Slender; thread-shaped (*filiform*); much branched. Stem undivided or once forked; set with very long, wavy, horizontally-spread, alternate branches, all tapering to the end. These re-branched with a second, finer set of similar character. Both stem and branches clothed with very short slender branchlets, tapering at both ends, which spring all round the stem. Root a disc. Internal structure, a slender tube in the centre, surrounded by large cells; the whole encircled in cortical branchlet*eens* immersed in gelatine.

Measurement. From 6 to 12 inches long.

Fructification. Only one kind known. *Spores* immersed in centre of the fringing branchlets, which are then swollen (see figure of a magnified bit).

Habitat. Yarmouth and the southern shores of England. South and west of Ireland. Isle of Man. West of Scotland. Thrown up from deep water. Very rare.

Fig. 219. GLOIOSIPHONIA CAPILLARIS.

Colour. Rose-red; though scarcely when first gathered.

Substance. Exceedingly gelatinous; loose and slippery-feeling.

Character of Frond. Long, cylindrical, tubular stems, profusely branched; bushy; tufted; each forming a more or less lanceolate, general outline. Stems undivided, delicately tapering to both ends; set with opposite, often *quadrifarious* (springing from four points of the stem) branches; which are bushily rebranched with repeatedly divided branchlets. Branchlets very slender or thickened with fructification; springing from all round the stems. Root a disc; throwing up several fronds.

Measurement. From 3 to 12 inches long.

Fructification. Only one kind known. Round masses of bright-red *spores* immersed in the (then) swollen branchlets.

Habitat. Our shores generally. Filey, Largs, &c. In tide-pools, near low-water mark. Very rare generally. Common in Jersey.

Whimsical in its appearance and *dis*appearance in different seasons, but there is a large, transparent, not very deep pool, on the lowermost ledges of Filey Bridge, north, where it may generally be gathered by those who will wade in to reach it!

PLATE XLIX.

Fig. 220. DUDRESNAIA COCCINEA.

Colour. Rosy-red; pinkish when young.

Substance. Very tender and gelatinous; loose and slippery-feeling.

Character of Frond. Cylindrical stem and branches; rather distantly, and very irregularly divided (alternate, opposite, forked, or secund); each set gradually finer upwards. Branchlets much divided; young specimens, when seen through a lens, looking as if beaded with rose-coloured dots owing to the structure (*densely-tufted, dichotomous filaments, whorling a colourless axis!*)

Measurement. From 4 to 8 inches long.

Fructification. Of two kinds. 1. Dark red globules of *spores* attached to the filaments which form the outer layer of the frond. 2. *Tetraspores* in transparent cells similarly placed. Very rare.

Habitat. Southern shores of England and Ireland. On rocks near low-water mark; or from deep water. Very rare.

Fig. 221. DUDRESNAIA DIVARICATA.

Colour. Pale red.

Substance. Gelatinous; very soft; elastic.

Character of Frond. A cylindrical, thread-like (*filamentous*), much-branched stem; undivided; set with long opposite or alternate, horizontally-spread branches. Branches three or four times re-branched; all the branches alternate; horizontally spread. Branchlets numerous; horizontal; obtuse.

Measurement. From 3 to 6 inches long.

Fructification. Only one kind known. Globules of *spores* attached to the filaments which form the outer layer of the frond.

Habitat. The warmer stations on our coasts. On stones and the smaller algæ near low-water mark; and deeper. Very rare.

Now *Helminthora divaricata.*

Fig. 222. PTILOTA SERICEA.

Colour. Usually a dull, brownish-red; sometimes brighter. Brown when old.

Substance. Very soft and limp; sometimes dense and almost spongy.

Character of Frond. Extremely narrow; sometimes thread-like (*filamentous*), but compressed; excessively branched in a formal manner. Main stems irregularly divided; rough below with minute branchlet stumps. Branches re-branched; with short, curved, exactly opposite, horizontally-spread branchlets. These re-branchleted once or twice in the same way. Stem and branches opaque. Ultimate branchlet*eens* jointed. (See figure of a magnified bit.)

Measurement. From 2 to 6 inches long.

Fructification. Of two kinds. 1. Clustered globules of *spores*, surrounded with six or eight minute slender branchlet*eens* (*ramelli*), which fold over them (*involucrated*); stalked; formed at the end of the branchlets. 2. Globules of *tetraspores* formed in the tips of the same.

Habitat. Our coasts generally. On perpendicular rocks between tide-marks. Rarely on the stems of *Fucus serratus.* Common.

Now *Ptilota elegans.* This is the only Ptilota found on the south coast of England.

Fig. 223. PTILOTA PLUMOSA.

Colour. A fine dark red; sometimes very clear and bright.

Substance. Rather rigid.

Character of Frond. Thread-like (*filamentous*), but flat; excessively branched in a formal manner. Main stems irregularly divided; smooth; set with branches of irregular lengths. Branches re-branched; secondary set (and sometimes the primary) clothed throughout with shortish, curved, wide-spread branchlets. These re-branchleted once or twice in the same way. Stem branches and branchlets unjointed; opaque.

Measurement. From 3 to 14 inches long.

Fructification. Of two kinds. 1. Clustered globules of *spores*, surrounded with six or eight minute, slender branchlet*eens* (*ramelli*), which fold over them; stalked; formed on the end of the then shortened branchlets. 2. Globules of *tetraspores* formed in the tips of the same.

Habitat. Northern and western coasts of Great Britain and Ireland. On the stems of *Lam. digitata.* Frequent.

The first set of *branchlets* are often not re-branchleted quite close to their base, so that the bare spaces look like a narrow white line between them and the stem. This is not the case in *P. sericea*, so that it serves as a clue between the species.

PLATE L.

Fig. 224. PEYSSONELIA DUBYI.

Colour. Brownish-red.
Substance. Membranaceous.
Character of Frond. A thin, incrusting expansion, at first simple and circular; afterwards cut into divisions (*lobes*); attached to whatever it grows upon by the whole of its under surface, which throws out woolly rootlets. Upper surface marked by rings of lines (*concentric zones*).
Measurement. From 1 to 2 inches across.
Fructification. Only one kind known. *Tetraspores* hidden among radiating threads in wart-like prominences.
Habitat. North of Ireland and west of Scotland. Probably in many places. On old shells, stones, &c., on scallop-banks in from ten to fifteen feet water. Not uncommon.

Fig. 225. GIGARTINA ACICULARIS.

Colour. A dull purple-red; darker when dry.
Substance. Gristly.
Character of Frond. Cylindrical; wiry; irregularly branched; tufted; of much the same thickness throughout, all but the tips, which are remarkably pointed. Stems curved or wavy; simple or forked. Branches curved and re-curved; wavy; wide-spreading in all directions; once or twice re-branched. Branchlets short, distant; either alternate, opposite, or forked; oftenest *secund.* Root fibrous.
Measurement. From 2 to 4 inches long.
Fructification. Only one kind observed. Clusters of *spores* in globose *capsules; sessile* on the branchlets; often several together.
Habitat. South coast of England. Jersey. Belfast. On rocks near low-water mark. Rare.

For other *Gigartinas* refer back to Plate XLIV. Fig. 201; Plate XLIII. Fig. 197; and Plate XLII. Fig. 194.

Fig. 226. GINANNIA FURCELLATA.

Colour. Sometimes a pale pinky, sometimes a dull red, becoming deeper in drying.
Substance. Membranaceous; fleshy; tender.
Character of Frond. Cylindrical; the thickness of a goose-quill throughout; repeatedly and regularly forked (*dichotomous*) from a very short taper stem; forming a circle when spread. Occasional specimens, midribbed; or sometimes constricted here and there as if jointed. Tips obtuse; broken ones sometimes throwing out fresh frondlets. (See figure.) Root a disc.
Measurement. From 2 to 6 inches long. Diameter of branches varying greatly up to half an inch.
Fructification. Only one kind known. Globular masses of *spores*, immersed in the frond. Showing through, when held up to the light.
Habitat. Eastern and southern shores of England. Ireland, all round; and very fine; Scilly. On rocks, &c. from low-water mark to eight or ten fathoms' depth. Rare.

Now *Scinaia furcellata.*

Fig. 227. CRUORIA PELLITA.

Colour. Blood-red.

Substance. Gelatinous; leathery.

Character of Frond. Skin-like; closely adhering; forming smooth glossy patches, at first circular, afterwards irregular in shape, on the surface of smooth rocks. Composed of minute, densely packed, upright, simple, or nearly simple jointed threads (*filaments*).

Measurement. Indefinite, up to 2 inches in diameter.

Fructification. Only one kind known. *Tetraspores, globular;* divided crosswise (*cruciate*) in the middle of each filament; immersed in an enlarged cell.

Habitat. On smooth, exposed rocks and stones at high-water mark. Jersey, Miss Turner. Near Gourock on the Clyde, Mr. Roger Hennedy. Very rare.

Now *Petrocelis cruenta,* see Appendix of New Species, page 92 under *Cruoria pellita.*

Fig. 228. PHYLLOPHORA PALMETTOIDES.

Colour. Rosy-pink.

Substance. Membranaceous; the stem elastic.

Character of Frond. Flat; ribless; narrow-oblong or wedge-shaped; leafy; expanding from a cylindrical, simple or branched stem. Leaves simple or once-forked; the first always wedge-shaped; bearing leaflets from their surface or tips.

Measurement. From ½ an inch to 2 inches long.

Fructification. Only one kind observed. *Tetraspores* forming large oval groups (*sori*); lying across the frond near the tips; immersed in the substance.

Habitat. South coast of England. On rocks near low-water mark. Rare.

For other *Phyllophoras* see Plate XLV.

Fig. 229. CROUANIA ATTENUATA.

Colour. Brownish or purplish-red, fading to a dusty pink.

Substance. Gelatinous.

Character of Frond. Slender; thread-like (*filamentous*); jointed; much branched. Main divisions partly forked (*dichotomous*); branches alternate; more or less re-branched; the joints clothed all round (*whorled*) with very short, delicate, many-times-divided branchlet*cens* (*ramelli*).

Measurement. One or 2 inches long.

Fructification. Only one kind observed in England. Large oval *tetraspores* in transparent cells; seated on the *whorled* branchlets, either in pairs, or all round.

Habitat. South coast of England. Parasitical on smaller algæ. Very rare.

Plate LI.

Fig. 230. MICROCLADIA GLANDULOSA.

Colour. A fine rose-red.

Substance. Membranaceous, though firm.

Character of Frond. Thread-like (*filamentous*), though compressed; of nearly the same width throughout; tufted; much branched from the base, in an alternate or irregularly forked manner; forming a roundish outline. Angles of branching (*axils*) wide-spread; last branchlets short; tips either awl-shaped or split, in which case they resemble pincers.

Measurement. One or 2 inches long.

Fructification. Of two kinds. 1. Masses of *spores* in roundish *capsules;* surrounded by two or three short branchlet*eens* (*ramelli*); *sessile* on the margin of the branches. 2. *Tetraspores* imbedded in the tips of the same.

Habitat. South and east coasts of England and Ireland. Hompton (N. of Hull). Bray. Kingstown. Scilly.

Fig. 231. CERAMIUM DECURRENS.

Colour. A dull purplish-pink.

Substance. Soft.

Character of Frond. Tufts of jointed threads (*filaments*); much branched. *Filaments* thicker than hog's bristles below, gradually finer upwards; distinctly forked; naked, or furnished with a few scattered branchlets; the tips hooked inwards.

Joints. Partially coloured; a narrow transparent space in the centre of each (see figure), the coloured portion melting gradually into the white.

Measurement. From 6 to 8 inches long.

Fructification. Not observed.

Habitat. Our coasts generally. On rocks and the smaller algæ in tide-pools. Rare.

Fig. 232. CERAMIUM GRACILLIMUM.

Colour. A dark reddish-purple.

Substance. Very soft, tender, gelatinous.

Character of Frond. Tufts of jointed threads (*filaments*); much branched. *Filaments* excessively slender, more so than a human hair; of nearly the same thickness throughout; regularly forked, or nearly so; the branches set with minute many-times-divided branchlets, spreading fan-wise; the tips slightly hooked.

Joints. Colourless. Partition-lines (*dissepiments*), opaque, purple.

Measurement. From 2 to 3 inches long.

Fructification. Only one kind observed. Minute *spores* in large roundish *capsules*, *sessile* on the branchlets, often two together. With several slender branchlet*eens*, ray-like, spreading below them; their tips forked.

Habitat. South of England and west of Ireland. On *Corallina officinalis*, &c. between tide-marks. Not common.

Fig. 233. CERAMIUM STRICTUM.

Colour. Dark, livid purple, in deep water, paler and yellower in sunny situations.

Substance. Membranaceous, but not very firmly adhering to paper.

Character of Frond. Tufts of jointed threads (*filaments*); branched. *Filaments* as fine as human hair; of nearly the same thickness throughout; irregularly forked; distantly branched below; more frequently and closely divided above; all the divisions upright and straight, with narrow sharp angles. The tips straight, or slightly hooked inwards.

Joints. Colourless. Partition-lines (*dissepiments*), opaque, purple.

Measurement. From 2 to 4 inches long.

Fructification. Of two kinds. 1. Minute *spores* in roundish *capsules*, *sessile* near the tips of the branches; surrounded by several short slender branchlet*eens* (*ramelli*) (*involucrated*). 2. *Tetraspores* immersed in the partition-lines of the joints. Very prominent.

Habitat. South coast of England. South and west of Ireland. On *corallines*, &c. in tide-pools near low-water mark. Not common.

Fig. 234. CERAMIUM NODOSUM.

Colour. A delicate red.

Substance. Rigid; rather harsh to the touch when fresh. Imperfectly adhering to paper.

Character of Frond. Tufts of jointed threads (*filaments*), excessively divided. *Filaments* as fine as human hair, or finer, of the same thickness throughout; repeatedly and regularly forked, the angles of branching (*axils*) very wide. The tips slightly hooked.

Joints. Colourless. Partition-lines (*dissepiments*), dark and swollen.

Measurement. From 3 to 6 inches long.

Fructification. Of two kinds. 1. Minute *spores* in globose *capsules*, *sessile* on the tips of short special branchlets; with one or two minute, slender branchlets below. 2. *Tetraspores*, two or three together, borne on the outer edge of short special branchlets.

Habitat. On sandy shores, often at the roots of *Zostera*. Generally distributed.

Fig. 235. CERAMIUM FASTIGIATUM.

Colour. Pinky purple.

Substance. Soft and tender.

Character of Frond. Tufts of jointed threads (*filaments*) much branched. *Filaments* very slender; hair-like; of nearly the same thickness throughout; regularly and repeatedly forked from the base. The lower angles of branching (*axils*) distant, the upper very close; all narrow; the tips cut to one level, forming a round outline; hooked inwards.

Joints. Lower ones colourless; upper coloured. Partition-lines (*dissepiments*) opaque; swollen, purple.

Measurement. Four or 5 inches long.

Fructification. Only one kind observed. Minute *spores* in small round *capsules* near the tips of the branchlets, with three or four very slender branchlet*eens* below.

Habitat. Our coasts generally. On rocks in tide-pools. Rare.

Plate LII.

Fig. 236. CERAMIUM DESLONGCHAMPSII.

Colour. Dark purple; almost blackish to the naked eye; on examination variegated with white.

Substance. Rigid (for so delicate a plant).

Character of Frond. Tufts of distinctly jointed threads (*filaments*). Filaments nearly as thick as hog's bristles below; becoming gradually finer upwards; much branched in an irregularly forked manner; more or less furnished with very slender, simple or forked branchlets. Tips fine; straightish; spreading.

Joints. In variegated bands. Colourless and transparent in the middle; purplish and opaque at and near the partition-lines (*dissepiments*).

Measurement. From 3 to 4 inches long.

Fructification. Of two kinds, but only one clearly made out. *Tetraspores* set round the joints; half-immersed; very prominent. The other, dark, irregular-shaped lumps like clusters of small *capsules*, *sessile* on the stems and branches.

Habitat. Our coasts generally. On rocks, &c. between tide-marks. Not uncommon.

Fig. 237. CERAMIUM DIAPHANUM.

Colour. Pinkish-red in general hue; but clearly variegated with white.

Substance. Rather soft.

Character of Frond. Tufts of distinctly jointed threads (*filaments*). *Filaments* the thickness of a hog's bristle below, becoming gradually finer upwards; irregularly branched; partly forked, partly alternate; re-branched in the same way, set at greater or less intervals throughout with short or long, more or less forked branchlets, much more slender than the branches from which they spring. Tips hooked inwards.

Joints. In variegated bands. Colourless and transparent in the middle, red, opaque, and swollen at, and near, the partition-lines (*dissepiments*), coloured bands wide throughout.

Measurement. From 2 to 6 inches long.

Fructification. Of two kinds. 1. Minute *spores* in roundish *capsules*, with one or two short branchlet*eens* underneath; *sessile* in the last forkings, or on the tips of side branchlets. 2. *Tetraspores* set round the joints.

Habitat. Our coasts generally. On the smaller algæ in tide-pools. Common.

Fig. 238. CERAMIUM FLABELLIGERUM.

Colour. Dull purple to the naked eye, on examination, of different shades.

Substance. Rigid.

Character of Frond. Tufts of jointed threads (*filaments*) spreading fan-wise above. *Filaments* as thick as hog's bristles; irregularly branched; partly forked; partly alternate; much re-branched above; set with forked branchlets. Tips pointed; straight and spreading; or somewhat curved inwards.

Joints. In variegated bands, but when young filled with a purplish fluid which hinders their detection. Afterwards colourless and transparent in the middle; purple and opaque near the partition-lines (*dissepiments*). These armed on one side with a solitary, minute, coloured (when dry, white) thorn.

Measurement. From 2 to 3 inches high.

Fructification. Of two kinds. 1. Minute *spores* in large irregular-shaped *capsules*, *sessile* on the branchlets, with two or three short branchlet*ecus* underneath. 2. *Tetraspores* set round the joints.

Habitat. Our coasts generally. On the smaller algæ, &c. between tide-marks.

Fig. 239. CERAMIUM ECHIONOTUM.

Colour. Dark red or purple when young and fresh, variegated with white when old or dry.

Substance. Rigid and harsh for so delicate a plant.

Character of Frond. Dense tufts of distinctly jointed threads (*filaments*). *Filaments* slender, of nearly the same thickness throughout; repeatedly and regularly forked, forming roundish outlines; frequently set with forked branchlets. Tips more or less hooked in.

Joints. In variegated bands. Colourless and transparent in the middle, reddish or purplish at, and near, the partition-lines (*dissepiments*). These armed all round with a number of slender, hair-like bristles, sticking out in all directions.

Measurement. From 1 to 3 inches long.

Fructification. Of two kinds. 1. Minute *spores* in double *capsules, sessile* on the sides of the branchlets, surrounded by several curved branchlet*eens*. 2. *Tetraspores* set round the joints.

Habitat. South coasts. On rocks, &c. between tide-marks. Not common.

Fig. 240. CERAMIUM ACANTHONOTUM.

Colour. Dark purple or red, variegated with white.

Substance. Rigid and harsh for so delicate a plant.

Character of Frond. Dense tufts of jointed threads (*filaments*). *Filaments* slender; of nearly the same thickness throughout; repeatedly and regularly forked, forming roundish outlines. Tips (and often the two or three last forkings) strongly hooked in.

Joints. In variegated bands. Colourless and transparent in the middle, purple and opaque at, and near, the partition-lines (*dissepiments*); the coloured bands widest upwards. Each of these armed on the outer side with a solitary, strong, coloured thorn (when dry, white), curved upwards.

Measurement. From 2 to 6 inches long.

Fructification. Of two kinds. 1. Minute *spores* in roundish *capsules* with a solitary curved branchlet*een* underneath. 2. *Tetraspores* set round the joints.

Habitat. Our coasts generally. On rocks, &c. between tide-marks. Common.

Fig. 241. CERAMIUM CILIATUM.

Colour. Pale purple or red; clearly variegated with white.

Substance. Rigid and harsh for so delicate a plant.

Character of Frond. Dense tufts of jointed threads (*filaments*). *Filaments* slender; of nearly the same thickness throughout; repeatedly and regularly forked; with or without side branchlets. Tips (sometimes the two or three last forkings) strongly hooked in.

Joints. In variegated bands. Colourless and transparent in the middle, purplish-red at, and near, the partition-lines (*dissepiments*). These armed all round with a line of strong colourless thorns.

Measurement. From 2 to 6 inches long.

Fructification. Of two kinds. 1. Minute *spores* in roundish *capsules* with two or three branchlet*eens* underneath. 2. *Tetraspores* set in the coloured bands of the joints with a thorn between each.

Habitat. Our coasts generally. On rocks, &c. at low-water mark. Not uncommon.

PLATE LIII.

Fig. 242. CERAMIUM RUBRUM.

Colour. Sometimes clear red, sometimes darker; brownish-yellow and white in decay; on examination, of different shades.

Substance. Firm when fresh; soon turning flabby; giving out a pleasant smell.

Character of Frond. Tufts of jointed threads (*filaments*). *Filaments* sometimes coarse, sometimes slender; becoming finer upwards from the base; much and irregularly branched in a partly forked, partly alternate manner; set throughout more or less with once-forked, or many-times-divided, often *secund* branchlets. Tips hooked in.

Joints. Coloured throughout red, but in different shades. Darkest at, and near, the partition-lines (*dissepiments*), which are always slightly contracted, and in drying often shrink considerably.

Measurement. From 2 to 12 inches long.

Fructification. Of two kinds. 1. Minute *spores* in globose *capsules*, with two or three short, curved branchlet*eens* underneath; mostly borne on the side-branchlets. 2. *Tetraspores* set round the joints.

Habitat. Our coasts generally. In pools from high to low-water mark, and beyond. Very common.

No description can include all the varieties of this most variable plant, but whether dark or pale, bright or dingy, it is coloured throughout, though in shades; and as there is but one other *un-thorned* British *Ceramium* (*C. botryocarpum*) in which this is the case, the detection of delusive varieties is not so difficult as may be thought. From *C. botryocarpum* it differs entirely in its capsular fruit.

Fig. 243. CERAMIUM BOTRYOCARPUM.

Colour. A dull purplish-red, fading to green and yellow; on examination, of different shades.

Substance. Rigid.

Character of Frond. Tufts of jointed threads (*filaments*). *Filaments* crooked at the base; rather coarse; becoming gradually finer upwards; much and irregularly branched; in a sometimes forked, sometimes alternate manner; closely set with numerous short, simple, or once or twice divided branchlets. Tips straight.

Joints. Coloured throughout dull purplish-red, but in different shades. Darkest at, and near, the partition-lines (*dissepiments*), which are always slightly contracted, and in drying shrink considerably.

Measurement. From 2 to 6 inches long.

Fructification. Of two kinds, but only one thoroughly made out. *Tetraspores* set round the joints. The other consists of minute dark fruit-warts heaped together in roundish clusters; *sessile* on the branchlets. Occasionally a true *capsule*, with two or three branchlet*eens* underneath, has been met with.

Habitat. Our coasts generally. On rocks, &c. between tide-marks. Common.

Besides the clumsy and unusual fruit, this plant is darker than *C. rubrum*, and more purple. Moreover, the tips of all the branchlets are straight, instead of hooked in.

Fig. 244. GRIFFITHSIA EQUISETIFOLIA.

Colour. Properly, a deep or dark rose-red; often brownish.

Substance. Soft and spongy; yet firm.

Character of Frond. Thick cylindrical stems and branches; several times re-branched in a loose irregular manner; everywhere surrounded and densely clothed by rings (*whorls*) of tiny, incurved, many-times forked, jointed branchlet*eens* (*ramelli*), set at very short, regular intervals. The branchlet*eens* about one-tenth of an inch long, and overlapping each other. Branches and branchlets, all tapering greatly to both ends.

Measurement. From 3 to 8 inches long.

Fructification. Of two kinds. 1. Minute *spores* in clustered *capsules*, with a circle of special curved branchlet*eens* folding over them; borne on the tip of a shortened branch. 2. *Tetraspores* attached to the inside of another set of special curved branchlet*eens*.

Habitat. Southern, S.-Eastern, and Western shores of England and Ireland. Frequent. Rare in Scotland.

Now *Halurus equisetifolius.*

Fig. 245. SPYRIDIA FILAMENTOSA.

Colour. A dull red, fading to brownish.

Substance. Soft, but not gelatinous. Stems firmly elastic.

Character of Frond. Thread-shaped (*filiform*); tufted; much branched. Stems nearly opaque; with an obscure appearance of joints. Branches spreading, many times compounded; more or less beset, the younger ones especially, with very minute, hair-like, simple or subdivided, jointed branchlet*eens*.

Measurement. From 2 to 8 inches long.

Fructification. Of two kinds. 1. Minute *spores* in stalked, gelatinous, double *capsules*, with three or four special branchlet*eens* underneath. 2. External *tetraspores*, *sessile* on the branchlet*eens*.

Habitat. Southern shores of England. Blackgang, Isle of Wight. Holyhead. On rocks near low-water mark.

More plentiful in the Channel Islands, and along the French coast, than on the shores of England, where the specimens are of a brownish colour, and not finely grown.

Plate LIV.

Fig. 246. GRIFFITHSIA SECUNDIFLORA.

Colour. A fine rich crimson.

Substance. Gelatinous, but firm.

Character of Frond. Tufts of distinctly jointed threads (*filaments*). *Filaments* robust (decidedly thicker than a hog's bristle!), very nearly the same thickness throughout; each stem simple at first, irregularly forked upwards; the last divisions often close; spreading wedgewise (see magnified bit), forming a circular outline. Angles of branching (*axils*) very narrow. Branchlets very upright. Tips very blunt.

Measurement. From 4 to 8 inches long.

Fructification. Has not yet been seen in Britain.

Habitat. Plymouth. On rocks at extreme low-water mark. Very rare.

The robust stems, strongly marked joints (quite obvious to the naked eye, especially when dried), very narrow *axils*, upright branching, and remarkably blunt tips, distinguish this from every other *Griffithsia.*

Fig. 247. GRIFFITHSIA SIMPLICIFILUM.

Colour. A fine pinky-red.

Substance. Soft and spongy, but firm.

Character of Frond. Thickish, cylindrical stems and branches, once or twice re-branched in a loose, irregular manner; surrounded and densely clothed by rings (*whorls*) of tiny, straight, overlapping, jointed branchlet*eens* (*ramelli*), once forked near the base (see magnified bit). Branches and branchlets tapering greatly to the tips; the latter often bare of branchlet*eens* below, but generally clothed with them near the top.

Measurement. From 4 to 8 inches long.

Fructification. Not observed; but no doubt like that of *G. equisetifolium.*

Habitat. Coasts of Norfolk and Wicklow. On rocks, &c. near low-water mark, and at a greater depth. Very rare.

Now *Halurus simplicifilum.* Probably only a slender, drawn-out variety of *G. equisetifolia.* The points of *differentiation* are, that it is less rebranched; that the branchlet*eens* are straighter and only once forked; and that the whole plant is more slender, and perhaps of a brighter colour. But intermediate specimens are constantly found. For other *Griffithsias* see Plate LV.

Fig. 248. SEIROSPORA GRIFFITHSIANA.

Colour. Beautifully rosy.

Substance. Delicately soft.

Character of Frond. Thread-like (*filamentous*); jointed; solitary, or tufted; excessively branched. Stem as thick as a hog's bristle below; becoming gradually finer upwards; undivided (generally); furnished with alternate, slender, undivided, longish, almost horizontally set branches. Branches becoming finer upwards; clothed throughout with short, soft, hair-like, many-times-forked branchlets; spreading to every side. Last divisions cobwebby.

Joints. Obscure in the stem and branches, which are opaque and veiny; visible; (when examined through the microscope) in the branchlets.

Measurement. From 2 to 6 inches long.

Fructification. Only one kind known. *Tetraspores* in bead-like cells strung together; formed in a few divisions of the last branchlets; looking like ruby drops.

Habitat. A few places on the south and west coasts. On rocks, &c. in very deep water. Very rare.

Dr. Harvey now includes this plant among the *Callithamnions.* It is the *Callithamnion seirospermum* of his "Nereis Boreali-Americana." A much slenderer form with the so-called *seirosporian* fruit has been found at Douglas. Possibly, therefore, this mode of fructification is only what gardeners call a *sport.*

Fig. 249. WRANGELIA MULTIFIDA.

Colour. A fine, transparent rose-red; soon fading.

Substance. Soft; elastic.

Character of Frond. Thread-like (*filamentous*); jointed; stem and branches. Stem the thickness of a hog's bristle, and undivided throughout; furnished on each side with long, simple, alternate, almost horizontally-set branches. These re-branched with another series which are occasionally forked or re-branched. Each joint of stem, branches, and branchlets beset, either in opposite pairs or all round (*whorled*), by numerous, short, slender, forked, jointed branchlet*eens* (*ramelli*).

Measurement. From 4 to 6 inches long.

Fructification. Of two kinds. 1. Clusters of *spores* in globose, stalked *capsules;* enfolded by special, slender branchlet*eens* (*ramelli*). 2. *Tetraspores* minute, oval, external; *sessile* on the brancle*teens.*

Habitat. South of England. West of Ireland and Scotland. On the perpendicular sides of rocks in pools near low-water mark, under the shade of other sea-weeds. Rare.

PLATE LV.

Fig. 250. GRIFFITHSIA BARBATA.

Colour. A beautiful, clear, rose-red; very soon given out in fresh water.

Substance. Soft; gelatinous; tender; soon decomposing in the air, and after a few minutes' immersion in fresh water.

Character of Frond. Dense tufts of jointed threads (*filaments*); forming a circle when spread out. Filaments slender below; becoming still more so above; repeatedly forked; each joint slightly swollen upwards; the last few furnished with long, opposite, or surrounding (*whorled*) hair-like, jointed branchlet*eens*, on which the *tetraspores* are borne.

Measurement. From 2 to 3 inches long.

Fructification. Of two kinds. 1. Minute *spores* in globose, stalked *capsules;* enfolded by special, slender branchlet*eens* (*ramelli*). 2. *Tetraspores*, globose, borne on the hair-like, jointed branchlet*eens.*

Habitat. The coasts of the British Channel. Jersey, &c. On the smaller algæ in tide-pools. Very rare.

Fig. 251. GRIFFITHSIA DEVONIENSIS.

Colour. A beautiful, clear rose-red; very soon given out in fresh water.

Substance. Soft; gelatinous; tender; soon decomposing in the air, and after a few minutes' immersion in fresh water.

Character of Frond. Dense tufts of jointed threads (*filaments*); forming a circle when spread out. Filaments very slender throughout; repeatedly forked; the lower angles of branching (*axils*) wide-spread; the upper narrow; the lower branches often throwing out root-like fibres which connect the filaments together below. Partition-lines (*dissepiments*) contracted.

Measurement. From 2 to 3 inches long.

Fructification. Only one kind observed. *Tetraspores* on the inner side of special branchlet*eens*, which surround the partition-lines (*dissepiments*) of the joints; always below the last forkings.

Habitat. South coasts of England. Muddy sea-shores in deep water. Rare.

Fig. 252. GRIFFITHSIA CORALLINA.

Colour. A beautiful, clear, rose-red; which is very soon given out in fresh-water; fading very quickly.

Substance. Soft; gelatinous; tender; soon decomposing in the air, and after a few minutes' immersion in fresh water.

Character of Frond. Tufts of strongly marked, jointed threads (*filaments*); forming a circular outline when spread out. Filaments more robust even than those of *G. secundiflora;* repeatedly and nearly regularly forked; the angles of branching (*axils*) wide-spread; divisions more distant below, very close above; each joint swollen upwards, pear-shaped; contracted at the base.

Measurement. From 2 to 4 inches long.

Fructification. Of two kinds. 1. Minute *spores* in roundish *capsules*, enfolded by special, slender branchlet*eens; sessile* on the sides of the branches. 2. *Tetraspores* on the inner side of special branchlet*eens* surrounding the partition-lines (*dissepiments*) of the joints.

Habitat. Our coasts generally. On rocks near low-water mark; generally in deep pools. Not uncommon.

Fig. 253. GRIFFITHSIA SETACEA.

Colour. A bright transparent crimson; which is given out very soon in fresh water.

Substance. Remarkably crisp and firm when fresh; soon becoming flabby and soft on exposure.

Character of Frond. Tufts of distinctly marked, jointed threads (*filaments*), forming a more or less rounded outline. Filaments as thick as hogs' bristles; very straight; irregularly forked; angles of branching (*axils*) narrow; lesser branches sometimes opposite; occasionally throwing out below a few root-like fibres, which connect the filaments together.

Measurement. From 3 to 6 inches long.

Fructification. Of two kinds. Minute *spores* in stalked, mostly double, *capsules;* surrounded by enfolding branchlet*eens.* 2. *Tetraspores* crowded on the inner sides of special enfolding branchlet*eens.*

Habitat. Our shores generally. On rocks, &c. between tide-marks under the shade of large algæ. Common.

Fig. 254. CALLITHAMNION PLUMULA.

Colour. A beautiful rose-red.

Substance. Delicately soft and tender.

Character of Frond. Tufts of jointed threads (*filaments*) very much branched. Stems undivided or somewhat forked; furnished with alternate or irregular slender branches; the upper ones longest and most divided; all the divisions and branches at one level (*distichous*); every joint bearing a pair of short, horizontal, or back-curved, exactly opposite branchlets, whose upper margin is clothed with a second set; these sometimes with a third; all regularly set like the teeth of small combs (*pectinated*).

Joints. Visible throughout (when examined through the microscope).

Measurement. From 2 to 5 inches long.

Fructification. Of two kinds. 1. Minute *spores* in large, dark-red, double *capsules; sessile* on the main branches. 2. Minute, globose *tetraspores* borne on the tips of the then shortened branchlet*eens.*

Habitat. Our coasts from Orkney to Devon, but in the warmer stations. Dublin, &c. On rocks, &c. near low-water mark. Not uncommon.

Fig. 255. CALLITHAMNION CRUCIATUM.

Colour. A brownish-red; soon fading to yellowish.

Substance. Soft and *flaccid* (limp).

Character of Frond. Dense tufts of jointed threads (*filaments*); branched, but rather sparingly. Stems irregularly divided into, or furnished with, a number of long, almost simple branches, which are sometimes rebranched. Each joint throughout, clothed with one or sometimes two pairs of slender, upright, sometimes simple, oftener re-branched, branchlet*eens.* These so crowded at the tips that they present a darkened appearance, like the eye in a peacock's tail.

Joints. Visible throughout (under the microscope).

Measurement. From 1 to 2 inches long.

Fructification. Only one kind known. *Tetraspores*, dark-red, *sessile* on the (then) shortened branchlet*eens.*

Habitat. South of England and south and west of Ireland. On mud-covered rocks near low-water mark. Rare.

Plate LVI.

Fig. 256. CALLITHAMNION BARBATUM.

Colour. A brownish or full red.

Substance. Membranaceous, and somewhat rigid.

Character of Frond. Dense tufts of jointed threads (*filaments*); irregularly branched. Stems rising from creeping fibres bearing opposite, or sometimes alternate, branches. These long, and either simple or clothed for half their length (and irregularly here and there) with minute, opposite, spine-like branchlet*eens*, which die down in winter.

Joints. Visible throughout*; deeply coloured.

Measurement. From 1 to 2 inches long.

Fructification. Only one kind known. Narrow oval *tetraspores, sessile* on the lowermost joints of the branchlet*eens*.

Habitat. Ilfracombe, Penzance, and Weymouth. On mud-covered rocks within tide-marks. Very rare.

* "*When examined under the microscope*," must always be understood in speaking of these delicate plants.

Fig. 257. CALLITHAMNION BRODIÆI.

Colour. A brownish red.

Substance. Soft generally; stem elastic.

Character of Frond. Thread-like (*filamentous*); jointed; tufted or single; much branched. Stems hogs'-bristly below, becoming finer above; generally simple; furnished throughout with long, alternate, wide-spread branches, the lowermost longest. These bearing a secondary set, one to each joint, which spring in succession from each side of the stem (*quadrifariously*); the lowermost always longest; so that each branch has a spear-shaped outline. Secondary branches once or twice re-branched in the same way. Last branchlets somewhat back-curved; bearing towards their tips a few *secund* branchlet*eens*.

Joints. Obscure in the stems, which are somewhat opaque and veiny; visible in the branches and branchlets.

Measurement. From 1 to 3 inches long.

Fructification. Of two kinds. 1. Minute *spores* in large, roundish, solitary, or double *capsules; sessile* on the branchlets. 2. Globose *tetraspores*, sessile on the branchlet*eens*.

Habitat. Our coasts generally. On algæ near low-water mark. Rare.

Fig. 258. CALLITHAMNION BRACHIATUM.

Colour. Brownish red; becoming darker in drying.

Substance. Rigid for so delicate a plant.

Character of Frond. Thread-shaped (*filiform*); jointed; tufted or single; much branched. Stem the thickness of a hog's bristle; simple, or nearly so; set with branches which spring in succession from all sides (*quadrifariously*). Branches often re-branched in the same way; last set but one, slender, drawn out; furnished with short, alternate tufts of branchlets. Branchlets upright, awl-shaped; not tapering to the base, but gradually upwards to a fine point.

Joints. Obscure in the main stems, which are somewhat opaque and veiny; visible in the last branches and branchlets.

Measurement. From 1 to 1½ inches long.

Fructification. Only one kind known. Minute oval *tetraspores, sessile* near the tips of the branchlets.

Habitat. Our coasts generally. Parasitic on the larger algæ.

Probably only a slender variety of *C. tetragonum*.

Fig. 259. CALLITHAMNION TETRICUM.

Colour. A dull purplish-red or brown.

Substance. Rigid and harsh, but very fragile when once dried.

Character of Frond. Thread-shaped (*filiform*); jointed; tufted or single; much branched. Stems short and shaggy; dividing into several principal branches. Branches several times re-branched; ropy; closely furnished throughout with straight, rigid, hair-like branchlets; some simple; some clothed with short, regularly-set, alternate branchlet*eens.*

Joints. Obscure in the stems; visible in all the branches.

Measurement. From 2 to 8 inches long.

Fructification. Of two kinds. 1. Minute *spores* in large oval *capsules*, generally in pairs, *sessile* near the tips of the branchlet*eens.* 2. Minute oval *tetraspores, sessile* on little stalks which spring from the branchlet*eens.*

Habitat. South of England. South and west of Ireland. On perpendicular sides of rocks, between tide-marks. Frequent.

Fig. 260. CALLITHAMNION ROSEUM.

Colour. A fine purple-red when young; when old, brownish; becoming brighter in fresh water.

Substance. Very soft.

Character of Frond. Tufts of slender-jointed threads (*filaments*); excessively and loosely branched; often entangled. Stems set throughout with long, wavy, spreading branches, which are re-branched in a similar way. Secondary set furnished with branchlets, beautifully and regularly *plumed* like a feather with branchlet*eens.*

Joints. Visible throughout in young plants; in older, the stems opaque and full of veins.

Measurement. From 3 to 4 inches long.

Fructification. Of two kinds. 1. Minute *spores* in clustered *capsules, sessile* on the branchlets. 2. Oval *tetraspores, sessile* on the inner side of the branchlet*eens.*

Habitat. Our shores generally. On rocks and the larger *Fuci,* near low-water mark. Also in estuaries and muddy places. Not uncommon.

Fig. 261. CALLITHAMNION TRIPINNATUM.

Colour. A fine crimson.

Substance. Soft and delicate; closely adhering to paper.

Character of Frond. Tufts of jointed threads (*filaments*); much branched; the whole plant at one level. Stems furnished throughout with irregularly alternate branches. Branches set throughout with regularly alternate branchlets, beautifully plumed like feathers. Upper branchlet*eens,* longish; lower, short, or altogether wanting; one, however, always rising at the base of each branchlet.

Joints. Visible throughout, even under a pocket lens.

Measurement. From 1 to 2 inches long.

Fructification. Only one kind observed. Oval *tetraspores, sessile* on the branchlet*eens.*

Habitat. West of Ireland. On rocks at extreme low-water mark. Very rare.

The solitary branchlet*een* rising from the angles of branching (*axils*) distinguishes this plant from *C. Borreri,* which it otherwise much resembles.

Fig. 262. CALLITHAMNION ARBUSCULA.

Colour. Dark clarety-red, or brown.

Substance. Stems gristly; branchlets very soft.

Character of Frond. Thread-like (*filamentous*); jointed; single or tufted; excessively branched; bushy. Stem thick at base; often shaggy with fibres; bare at first; then set with irregular, alternate branches. Branches twice or thrice re-branched with shorter ones, which spring from all sides of the stem (*quadrifarious*); and are all densely clothed with minute, overlapping branchlets, also *quadrifarious.* Branchlets plumed with pointed, spreading or back-curved, simple or forked branchlet*eens*, springing from each joint.

Joints. Only visible in the branchlets and branchlet*eens.*

Measurement. From 3 to 8 inches long.

Fructification. Of two kinds. 1. Minute *spores* in large roundish *capsules; sessile,* two or three together on the branchlets. 2. Globose *tetraspores, sessile* on the inner side of the last branchlets.

Habitat. Western shores of Scotland and Ireland, abundant. East coast of Scotland, rare. Filey, plentiful on the north side of the bridge. On rocks and mussel-shells, &c., from half-tide level to low-water mark.

Not found on the same stations as *C. spongiosum.*

Fig. 263. CALLITHAMNION FLOCCOSUM.

Colour. A bright purplish-lake.

Substance. Very soft and flabby.

Character of Frond. Dense tufts of hair-like, jointed threads (*filaments*) much branched at intervals. Stems very slender; irregularly divided into several principal branches, which are again once or twice forked (*dichotomous*). Branches naked, or furnished at rather remote intervals with short, many-times-divided (almost tufted), alternate, lesser branches. Every joint of the whole plant bearing a pair of exactly opposite, very short, very slender, pointed branchlet*eens.*

Joints. Visible throughout.

Measurement. From 1 to 5 inches long.

Fructification. Only one kind observed. Oval *tetraspores* borne on the branchlet*eens* near their base.

Habitat. North of Scotland (Orkney, Aberdeen, &c.). On rocks near low-water mark. Very rare.

The fringing branchlet*eens* of this plant form so distinct a character that it is impossible to mistake it for any other species.

Fig. 264. CALLITHAMNION TETRAGONUM.

Colour. A full or brownish-red, becoming darker in drying; but occasionally, when young, brighter; turning orange in fresh water.

Substance. Rigid; elastic.

Character of Frond. Thread-like (*filamentous*); jointed; single or tufted; much branched; thicker than hogs' bristles below; becoming finer upwards. Set with branches which spring in succession from all sides of the stem (*quadrifarious*); the lowermost longest; several times re-branched in a similar manner; the last set but one densely clothed with short, alternate, wide-spread tufts of branchlet*eens*. Branchlet*eens* incurved; tapering at base; *suddenly* pointed at top; springing from all sides.

Joints. Obscure in the stems. Visible in all the branches.

Measurement. From 3 to 6 inches long.

Fructification. Of two kinds. 1. Minute *spores* in large, oval, single or double capsules; borne on a (then) shortened branchlet*een*. 2. *Tetraspores* excessively minute; *sessile* near the tips of the same.

Habitat. Our coasts generally. On the larger algæ near low-water mark. Common.

Fig. 265. CALLITHAMNION SPONGIOSUM.

Colour. A dull reddish-brown; quite without gloss.

Substance. Soft and flabby; holding water like a sponge.

Character of Frond. Thread-like (*filamentous*); jointed; single or tufted; much branched. Stems shrubby; branches long; wavily curved; spreading in every direction; thickly clothed (especially upwards), with one or more secondary, similar sets. These furnished throughout with branchlets; the branchlets crowded (especially upwards) with repeatedly forked (*dichotomous*) branchlet*eens*, which, springing from all sides, give each division a rounded, bushy character. Angles of branching (*axils*) wide.

Joints. Obscure in the main stems, which are more or less opaque and veiny. Visible in all the branches.

Measurement. From 2 to 4 inches long.

Fructification. Of two kinds. 1. Minute *spores* in roundish or divided (*lobed*) *capsules; sessile* on the stems of the branchlets. 2. *Tetraspores*, solitary; oval; *sessile* in the angles of branching (*axils*).

Habitat. Our coasts generally, in the warmer stations. Isle of Man. Scilly Isles. West of Ireland, &c. On perpendicular rocks near low-water mark; and on other algæ. Not uncommon.

Not found in the same stations as *C. arbuscula*.

Plate LVIII.

Fig. 266. CALLITHAMNION TURNERI.

Colour. A fine rose-red.
Substance. Soft but firm.
Character of Frond. Dense round tufts of jointed threads (*filaments*) rising from creeping fibres; branched. Stems upright; simple or slightly branched; once or twice plumed like a feather (*pinnate*), with short opposite branchlets (see magnified bit), very regularly arranged; the lowermost rather the longest, gradually diminishing upwards.
Joints. Visible throughout.
Measurement. From an inch to 1½ long.
Fructification. Of two kinds. 1. Minute *spores* in stalked, oval *capsules*, borne on the branchlets enfolded by branchlet*eens* (*involucrated*). 2. Globose *tetraspores*, either stalked or *sessile*, clustered or solitary, on the inner sides of the branchlets.
Habitat. Our coasts generally. Parasitic on several algæ between tide-marks. Common.

Fig. 267. CALLITHAMNION PLUMA.

Colour. Crimson.
Substance. Soft.
Character of Frond. Dense, very short tufts of jointed threads (*filaments*) rising from creeping fibres; sparingly branched. Stems upright; simple or slightly branched. Branches naked below, the upper half plumed like a feather, with short or long, very upright, close-set branchlets.
Joints. Visible throughout.
Measurement. One-quarter to ½ an inch high.
Fructification. Only one kind observed. Globose *tetraspores*, stalked or *sessile;* clustered or solitary; often at the tips of the branchlets.
Habitat. The warm stations on our coasts. Jersey. Miltown Malbay. Bantry Bay, &c. Parasitic on other algæ; generally on the stems of *Laminaria digitata.* Rare.

Fig. 268. CALLITHAMNION HOOKERI.

Colour. A brownish or rosy-red; the two tints often found on the same specimen.
Substance. Soft.
Character of Frond. Thread-like (*filamentous*); jointed; single or tufted. Stem as thick as a hog's bristle; closely furnished throughout with long, alternate, simple branches, which again bear a second or third set; sometimes springing from all sides of the stem; all set with very wide-spread branchlets, plumed like feathers; these re-branchleted with a second very short horizontal set.
Joints. Distinct only in the lesser branches and the branchlets.
Measurement. From 1 to 3 inches long.
Fructification. Of two kinds. 1. Minute *spores* in large oval *capsules; sessile* here and there on the branches. 2. Globose *tetraspores; sessile* along the inner sides of the branchlets near the base; either single or two or three together.
Habitat. Our coasts generally. On rocks and algæ between tide-marks. Not uncommon.

A rather woolly variety of this variable plant was once considered a separate species; *C. lanosum.*

Fig. 269. CALLITHAMNION BYSSOIDEUM.

Colour. A beautiful rose-red.

Substance. Gelatinous; exceedingly soft and delicate; rather glossy when dry.

Character of Frond. Dense tufts of excessively fine, jointed threads (*filaments*) very much branched. Stems very slender, much divided from the base, either into several principal branches, bearing a great number of lesser ones; or wholly composed of almost cobweb-like branches, inextricably entangled together. Branches forming a lanceolate outline; clothed with long, slender alternate branchlets, plumed like a feather, with a second lesser set, and these with branchlet*eens;* all alternate.

Joints. Distinct throughout.

Measurement. From 1 to 3 inches long.

Fructification. Of two kinds. I. Minute *spores* in large oval, twice-or-thrice-divided *capsules;* near the ends of the branches. 2. Oval *tetraspores;* mostly solitary; *sessile* near the base of the branchlet*eens.*

Habitat. Our coasts in several places. Parasitic on other algæ; on *Codium tomentosum* especially. Near low-water mark. Not uncommon.

Like *C. roseum*, but much more cobwebby.

Fig. 270. CALLITHAMNION POLYSPERMUM.

Colour. Dull rose-red, or purplish.

Substance. Soft.

Character of Frond. Dense round tufts of slender, jointed threads (*filaments*); loosely, very much branched. Stems irregularly divided; somewhat naked below; furnished with spreading branches above. Branches several times divided; set with lesser branches; the larger ones bearing short, spine-like, alternate branchlets; some quite simple, others re-branchleted, forming feather-like plumes; the plumes long and narrow; the upper ones occasionally more compound than those below. Branchlets spreading, occasionally even turned back.

Joints. Visible throughout.

Measurement. From 1 to 3 inches in diameter.

Fructification. Of two kinds. 1. Minute *spores* in large round *capsules; sessile* on the branchlets. 2. *Tetraspores* set along the inner sides of the plumes of the branchlets; very abundant.

Habitat. Our coasts generally. On algæ between tide-marks. Common.

Fig. 271. CALLITHAMNION FASCICULATUM.

Colour. A fine purple-red.

Substance. Soft.

Character of Frond. Tufts of very slender, jointed threads (*filaments*) much and bushily branched. Stems naked at the base, crowded above with long, wavy, very upright branches; their upper half closely plumed like a feather with branchlets. Lowermost branchlets (or plumes) short and simple; upper, long and spreading; re-branchleted once and again near the tips; producing a blunt outline.

Joints. Obscure in the nearly-opaque main stems. Visible in the branches. Partition-lines (*dissepiments*) contracted.

Measurement. Two or 3 inches long.

Fructification. Only one kind observed. Oval *tetraspores* at the base of the *plumes* of the branchlets.

Habitat. Yarmouth, Mr. Borrer.

Surely only a "sport" of *C. Borreri.*

PLATE LIX.

Fig. 272. CALLITHAMNION BORRERI.

Colour. A brilliant, deep, or pale rose-red, in different specimens; giving out its colour in fresh water.

Substance. Either rigid or very soft, in different specimens.

Character of Frond. Tufts of jointed threads (*filaments*) very much branched. Stems nearly simple; bare below, or set with only short branches; above furnished with long, spreading, wavy ones; their upper half clothed with branchlets beautifully plumed like a feather, with straight, wide-spread, alternate branchlet*eens;* the lowermost longest. Branchlet*eens* simple, or re-plumed near their tips: producing a round, blunted outline.

Joints. Visible throughout.

Measurement. From 1 to 3 inches long.

Fructification. Of two kinds. 1. Minute *spores* in double *capsules; sessile* near the tips of the branchlets. 2. Globose *tetraspores; sessile* on the inner sides of the branchlet*eens.*

Habitat. Our coasts generally. Douglas, Hompton, South coast, &c. On rocks near low-water mark. Rather rare.

Fig. 273. CALLITHAMNION AFFINE.

Colour. Pink or red. *Substance.* Soft.

Character of Frond. Thread-like (*filamentous*); jointed; much branched; bushy; single or tufted. Main stems furnished with very numerous, long, alternate branches, which are re-branched. Secondary branches long, alternately plumed like a feather with branchlets. Branchlets (or plumes) once plumed with branchlet*eens,* which are short and upright below; long and crowded upwards.

Joints. Obscure in the stems, which are opaque and veiny. Visible in the branchlets.

Measurement. Two or 3 inches long.

Fructification. Of two kinds. 1. Minute *spores* in large, roundish *capsules;* generally two together. *Sessile* on the stems of the branchlets. 2. Oval *tetraspores;* generally solitary; *sessile* on the lowermost cell of the branchlet*eens.*

Habitat. Bute. Once found by Dr. Greville.

Fig. 274. CALLITHAMNION GRACILLIMUM.

Colour. When quite recent, a deep red; becoming rose-red in fresh water; giving out its colour if soaked too long.

Substance. Extremely soft and delicate.

Character of Frond. Tufts of extremely fine, jointed threads (*filaments*); profusely branched. Stems dividing into numerous long, wavy, irregular main branches. Branches set throughout their whole length with a second similar set; these with compound branchlets; the upper ones beautifully plumed and re-plumed, with one, two, or even three sets of gradually diminishing branchlet*eens;* the lower shorter, less regular, and less compound. The whole branching at one level as if cut out (*distichous*). Outline of the principal branches broadly egg-shaped, of the upper branchlets long, narrow, lanceolate, pointed, strongly resembling minute fern-leaves.

Joints. Visible throughout.

Measurement. From 1 to 4 inches long.

Fructification. Of two kinds. 1. Minute *spores* in roundish double *capsules; sessile* on the principal branches. 2. Minute oval *tetraspores* on the tips of the (then) shortened branchlet*eens.*

Habitat. South and West of England. (Torquay, Milford Haven, Falmouth, Plymouth.) On mud-covered perpendicular rocks and piers near low-water mark. Rare.

Fig. 275. CALLITHAMNION THUYOIDEUM.

Colour. A fine rose-red. *Substance.* Soft and limp.

Character of Frond. Tufts (or single plants) of very five, jointed threads (*filaments*); very much branched. Stems exceedingly slender; nearly simple below, set above with alternate branches. These once or twice re-branched. The lesser ones, and sometimes all, clothed with branchlets, which are beautifully plumed and re-plumed with one, two, or even three sets of gradually-diminishing branchlet*eens*. The whole branching at one level, as if cut out. Outline of the plumed branches very narrow oblong.

Joints. Visible throughout.

Measurement. One or 2 inches long.

Fructification. Of two kinds. 1. Minute *spores* in large oval *capsules;* generally *sessile* on the sides (not at the tips) of the branchlets; very rare. 2. Globose *tetraspores* borne on the tips of the (then) shortened branchlet*eens*.

Habitat. Our coasts occasionally. Yarmouth, Plymouth, &c. On rocks near low-water mark. Rare.

Fig. 276. CALLITHAMNION CORYMBOSUM.

Colour. A pink or purplish-red.

Substance. Exceedingly soft, limp, and gelatinous; having a fine gloss when dried.

Character of Frond. Thread-like (*filamentous*); jointed; excessively branched. Stem hair-like below; cobweb-fine above (occasionally much more robust); closely set with long, alternate branches. Branches partly divided in a forked manner; partly alternate; re-branched in a similar way. The last series clothed with very compound, alternate branchlets. Branchlets zigzag; set at every joint with cobweb-fine, repeatedly-forked branchlet*eens*, of nearly uniform length; each tip, therefore, forming a roundish outline, something like those of *C. spongiosum;* but not so bushy.

Joints. Visible throughout; even in the stems.

Measurement. From 1 to 3 inches long.

Fructification. Of two kinds. 1. Minute *spores* in large, double *capsules; sessile* in the angles of branching (*axils*). 2. Minute, round *tetraspores*, a single one *sessile* on one side of the forked branchlet*eens*, immediately below the point where they fork.

Habitat. South and West of England. West of Scotland. Isle of Man. Ireland generally. On rocks, algæ, and *Zostera marina* near low-water mark. Not uncommon.

Fig. 277. CALLITHAMNION FLORIDULUM.

Colour. A purplish-pink. *Substance.* Soft and almost spongy.

Character of Frond. Dense tufts of fine, jointed threads (*filaments*), forming a roundish cushion on the rocks. Filaments equally slender throughout; once or twice forked; furnished with a few long, simple or forked, very upright branches; the upper ones sometimes clothed near the top with a few *secund* or alternate, upright branchlets (the lowermost longest), on which the *tetraspores* are borne.

Joints. Visible throughout under the microscope, or even through a pocket lens, having a peculiar shimmery appearance, from the silvery whiteness of the cell-membrane.

Measurement. About an inch high.

Fructification. Only one kind known. Minute, oval *tetraspores*, borne on very short, upright branchlets (or stalks), ranged in a *secund* manner along the upper branches.

Habitat. West of Ireland. Orkney. Land's End. Scilly. Isle of Man. On sand-covered rocks near low-water mark. Not uncommon.

Fig. 278. CALLITHAMNION ROTHII.

Colour. Deep red or purple.

Substance. Soft and velvety.

Character of Frond. Dense tufts of very short, fine, jointed threads (*filaments*); forming velvety patches on rocks. Filaments very slender; of one thickness throughout, slightly forked, irregularly branched. Branches very upright, rodlike; the upper ones sometimes set with a few *secund* simple or branched branchlets, on some of which the *tetraspores* are borne. Tips pointed.

Joints. Visible throughout.

Measurement. From $\frac{1}{4}$ to 1 inch high.

Fructification. Only one kind known. Small round *tetraspores*, often clustered together, borne on the (then) shortened end branchlets.

Habitat. Our coasts generally. Spreading over the surface of rocks at half-tide level. Common.

Fig. 279. CALLITHAMNION MESOCARPUM.

Colour. Purplish-red.

Substance. Soft, velvety.

Character of Frond. Tufts of minute, jointed threads (*filaments*), forming a broad, shaggy, purple crust on the rock. *Filaments* rising from creeping fibres, upright, simple or sparingly branched. Branches alternate, very upright; naked, or bearing a few little upright, often *secund* branchlets, on some of which the *tetraspores* are borne.

Joints. Visible throughout.

Measurement. One-fourth or $\frac{1}{6}$ of an inch high.

Fructification. Only one kind known. Oval tetraspores borne on the (then) shortened branchlets; often two on a branchlet.

Habitat. Appin. On rocks at low-water mark.

Fig. 280. CALLITHAMNION SPARSUM.

Colour. Purplish-red.

Substance. Soft, velvety.

Character of Frond. Very minute, scattered tufts of fine, jointed threads (*filaments*). Filaments nearly simple, upright, slightly branched upwards. Branches spreading; of unequal lengths, alternate or *secund;* the tips blunt.

Joints. Visible throughout.

Measurement. Scarcely $\frac{1}{10}$ of an inch high.

Fructification. Only one kind known. Bluntly oval *tetraspores*; *sessile* generally in the angles of branching (*axils*).

Habitat. Appin. Miltown Malbay. On old stems of *Laminaria saccharina,* and on *Cladophora rupestris.*

Very little observed, owing to its minuteness; but not uncommon.

Fig. 281. CALLITHAMNION DAVIESII.

Colour. Rose-red.

Substance. Soft.

Character of Frond. Very minute tufts of fine, jointed threads (*filaments*). Filaments very much branched. Branches spreading; curved; of unequal lengths; scattered; bearing little clusters of branchlets at their angles of branching (*axils*); the rest of the stems bare.

Joints. Visible throughout.

Measurement. One-quarter of an inch or thereabouts, high.

Fructification. Only one kind known. Minute, oval, stalked *tetraspores* borne on the shortest of the clustered branchlets; single or clustered.

Habitat. Our coasts generally, but preferring warm stations. Parasitic on *Ceramium rubrum* and other algæ; in pools between tide-marks. Not uncommon.

Fig. 282. CALLITHAMNION VIRGATULUM.

Colour. Rose-red.

Substance. Soft.

Character of Frond. Very minute tufts of fine, jointed threads (*filaments*). Filaments once or twice divided; very upright; set with secund, rod-like branches; bearing at each joint a short, blunt, bud-like branchlet; several on one side in succession.

Joints. Visible throughout.

Measurement. One-quarter of an inch, or thereabouts, high.

Fructification. Only one kind known. Minute, oval *tetraspores* borne on the bud-like branchlets, or in their place at the joints.

Habitat. Our coasts generally. On *Ceramium rubrum* and other algæ, between tide-marks. Not uncommon.

Fig. 283. CALLITHAMNION PEDICELLATUM.

Colour. A fine red; easily given out in fresh water.

Substance. Soft.

Character of Frond. Longish tufts of jointed threads (*filaments*) much branched. Filaments as thick as horse-hair, loosely and irregularly divided. Branches furnished with short, alternate clusters of branchlets; sometimes one to each joint, almost; more or less forked and spreading; their tips very obtuse.

Joints. Visible throughout, and very pellucid.

Measurement. For 2 to 8 inches long.

Fructification. Of two kinds. 1. Minute *spores* in large oval *capsules*, single or in pairs; *sessile* on the stems. 2. Oval or pear-shaped, very dark *tetraspores*, or little colourless stalks rising from the angles of branching (*axils*).

Habitat. Our shores generally. On rocks and wood-work near low-water mark. Frequent.

Now *Corynospora pedicellata.*

Fig. 284. CODIUM BURSA.

Colour. Dark green.

Substance. Stiffly and densely spongy.

Character of Frond. An irregularly round lump; composed of interwoven threads (*filaments*), densely matted together; hollow when old; several, of different ages and sizes, growing together in groups.

Measurement. From 1 to 8 inches in diameter.

Fructification. Little egg-shaped sacs (*sporangia*), containing a dark-green substance, which changes at maturity into seeds (*zoospores;* so called from having at one period a motion as if endowed with animal life); attached to the outer threads (*filaments*) of which the frond is composed.

Habitat. South coast of England. Jersey. Cornwall. Torquay. Not uncommon at Brighton. Very rare generally.

Fig. 285. CODIUM TOMENTOSUM.

Colour. Dark green.

Substance. Soft; densely spongy.

Character of Frond. Cylindrical, or somewhat compressed, smooth stem and branches, often thicker than a swan's quill throughout; more or less repeatedly but irregularly forked; sometimes beset with short side-branches.

Measurement. From 3 to 12 inches long.

Fructification. Little egg-shaped sacs (*sporangia*), containing a dark-green substance, which changes at maturity into minute seeds (*zoospores;* so called from having at one period a motion as if endowed with animal life); attached to the outer threads (*filaments*) of which the frond is composed.

Habitat. South and west coasts of Great Britain chiefly. Devonshire. Scilly. Miltown Malbay, &c.

Some specimens of this plant are much oftener divided and re-branched than others, and form a circle when laid out. For other *Codiums,* see next Plate.

Fig. 286. BRYOPSIS PLUMOSA.

Colour. A fine, deep, glossy green; stems especially glistening when dried and partly emptied of colouring matter.

Substance. Membranaceous, but firm; slippery.

Character of Frond. Thread-shaped (*filiform*); uninterruptedly tubular throughout; filled with green colouring matter; much branched. Stems sometimes undivided, and set with numerous close branches; sometimes irregularly forked. Branches naked below; above, closely plumed like a feather, with short, slender, nearly opposite branchlets; these sometimes re-branchleted with a smaller set (branchlet*eens*); the lower branchlets longest; upper, short; producing a lanceolate outline of branch. The whole at one level, or rarely otherwise.

Measurement. From 1 to 4 inches long.

Fructification. Minute seeds (*zoospores;* so called from having at one period a motion as if endowed with animal life); formed in the colouring matter of the frond.

Habitat. Our coasts generally. On rocks near low-water mark. Not uncommon.

Dr. Harvey describes it as "a plant whose branches resemble beautiful, glossy, bright-green feathers." It is well grown in Filey Bay on a flat ledge of rocks leading to "The Spittals," only uncovered at very low tides. In an Aquarium it sometimes degenerates into a very ugly, *unplumose* variety; the *B. Lamorouxii* of some authors.

Fig. 287. BRYOPSIS HYPNOIDES.

Colour. A fine yellowish green; stems especially glistening when dried and partly emptied of colouring matter.

Substance. Membranaceous, but firm; slippery.

Character of Frond. Thread-shaped (*filiform*); uninterruptedly tubular throughout; filled with green colouring matter; very much branched. Stems undivided or irregularly forked; furnished with long, alternate, re-branched or irregularly-divided branches; the lesser ones set with long, slender branchlets; more or less crowded with branchlet*eens* towards their tips. Branchlet*eens* springing from all sides.

Measurement. From 2 to 4 inches long.

Fructification. Minute seeds (*zoospores;* so called from having at one period a motion as if endowed with animal life); formed in the colouring matter of the frond.

Habitat. The warmer stations of our coasts. South of England. West of Ireland, &c. On rocks and the large algæ, especially *Laminaria saccharina,* at extreme low-water mark and beyond. Rare generally.

A slenderer, lighter coloured, and more compoundly-branched plant than *B. plumosa;* but intermediate specimens occur.

Fig. 288. CODIUM ADHÆRENS.

Colour. Dark green.

Substance. Gelatinous; densely spongy.

Character of Frond. A velvety crust, spreading over the surface of rocks in irregular patches.

Measurement. Patches, 2 or more feet in extent.

Fructification. Not observed, but no doubt the same as in other species of *Codium* (refer under Figs. 284 and 285).

Habitat. Torquay. Land's End. Gorran Haven. Falmouth. Co. Antrim, &c. On rocks near low-water mark. Very rare.

Fig. 289. CODIUM AMPHIBIUM.

Colour. A grassy green.

Substance. Soft; densely spongy.

Character of Frond. Minute; upright; cylindrical; round-topped; rising in great numbers from a spreading base of entangled threads (*filaments*); usually simple; rarely branched.

Measurement. From $\frac{1}{4}$ of an inch to 1 inch high; the patches spreading indefinitely.

Fructification. Not observed, but no doubt the same as in other species of *Codium* (refer under Figs. 284 and 285).

Habitat. Roundstone, and at the head of Birtirbui Bay, Galway. On turf-banks at high-water mark; washed over by the tides, but exposed to rain and air at other times.

Fig. 290. VAUCHERIA MARINA.

Colour. Bright green; becoming rather brownish when old; somewhat glossy when dry.

Substance. Exceedingly soft and limp.

Character of Frond. Fine tufts of hair-like threads (*filaments*). Filaments not jointed; tubular throughout; filled with green colouring matter (*endochrome*), which often runs partially out; irregularly branched; occasionally forked. Branches few, long, upright, blunt.

Measurement. From 1 to 3 inches long.

Fructification. Small, stalked, pear-shaped sacs (*sporangia*), containing a dark-green mass which changes at maturity into minute seeds (*zoospores;* so called from having at one period a motion as if endowed with animal life); borne on the branches.

Habitat. Torbay. Salcombe. Appin, &c. On algæ and mud between tide-marks.

This little plant grows profusely, even to a troublesome extent in aquariums, fruiting regularly in the summer.

Fig. 291. VAUCHERIA SUBMARINA.

Colour. A bright green.

Substance. Exceedingly soft and limp.

Character of Frond. Fine tufts of hair-like threads (*filaments*). Filaments not jointed; tubular throughout; filled with green colouring matter, which often runs partially out; repeatedly forked (*dichotomous*).

Measurement. Two or 3 inches long.

Fructification. Small, egg-shaped, or lanceolate sacs (*sporangia*), containing a dark-geen mass, which changes at maturity into minute seeds (*zoospores;* so called from having at one period a motion as if endowed with animal life.)

Habitat. Weymouth. On the muddy sea-shore. Rare.

Fig. 292. VAUCHERIA VELUTINA.

Colour. A deeper green than the preceding.

Substance. Densely spongy.

Character of Frond. A mass of tough threads (*filaments*); forming a velvety carpeting on mud. Filaments creeping; not jointed; tubular throughout; filled with green colouring matter (*endochrome*), which often runs partially out; sending up short, upright, simple or forked branchlets, cut to one height, like the pile of clipped velvet.

Measurement. The mass of green coating indefinite. Branchlets $\frac{1}{6}$ of an inch high.

Fructification. Small, stalked, globose sacs (*sporangia*), containing a dark-green mass, which, at maturity, is transformed into minute seeds (*zoospores;* so called from having at one period a motion as if endowed with animal life).

Habitat. Appin. Miltown Malbay. And on most muddy sea-shores.

Fig. 293. CLADOPHORA BROWNII.

Colour. Black-green when growing, but when the water is pressed out, and the plant held to the light, a beautiful yellow-green.

Substance. Very rigid; spongy.

Character of Frond. Exceedingly dense, cushion-like tufts of jointed threads (*filaments*) rising from a mass of creeping fibres. Filaments elastic; upright, furnished with a few long, nearly simple, secund branches; so matted together, that it is difficult to separate a single thread.

Joints. Four or five times longer than broad; the lower ones thickened upwards.

Measurement. From $\frac{1}{2}$ an inch to 1 inch high.

Fructification. Minute seeds (*zoospores;* so called from having at one period a motion as if endowed with animal life); formed of the colouring matter in the joints; and in due time bursting through them.

Habitat. Cornwall. North of Ireland. Wicklow. On rocks exposed to the dripping of fresh water, and the occasional overflow of the sea.

A plant belonging as much to the land as the sea.

Fig. 294. CLADOPHORA PELLUCIDA.

Colour. A fine, glossy, transparent green; fading in the herbarium.

Substance. Rigid; wiry; adhering very imperfectly to paper.

Character of Frond. Thread-like (*filamentous*); jointed; solitary or slightly tufted; distantly, much branched. Stems as thick as a hog's bristle; undivided at first; then forked (*dichotomous*), or three- (or even four-) armed (*trichotomous*); and, more or less, regularly continuing this character throughout. Upper branches furnished with branchlets of the same three-armed growth; or occasionally tufted. Branches re-branchleted.

Joints. From three-quarters of an inch to an inch long below; shorter upwards; branches springing from all the partition-lines (*dissepiments*); filled with green colouring matter (*endochrome*).

Measurement. From 4 to 6 inches long.

Fructification. Minute seeds (*zoospores**; so called from having at one period a motion as if endowed with animal life); formed of the colouring matter in the joints; and in due time bursting through them.

Habitat. Our coasts generally. In deep rock-pools near low-water mark. Not very common.

* This explanation of the word *zoospores* need not, surely, be continued longer. *C. pellucida* is, from its extremely long joints and three-armed branching, a quite clearly marked British species.

Fig. 295. CLADOPHORA RECTANGULARIS.

Colour. A full green; fading in the herbarium.

Substance. Rigid; bristling; adhering very imperfectly to paper.

Character of Frond. Thread-like (*filamentous*); jointed; several growing near together and entangled in intricate bundles; distantly, much branched. Filaments as thick as hogs' bristles throughout; set with long, wavy, wide-spread, exactly opposite branches; or, occasionally, irregularly divided. Branches rebranched in the same way; more or less furnished with very short, exactly opposite, horizontal branches, which are sometimes simple; sometimes re-branchleted with a second similar set.

Joints. Twice or thrice as long as broad throughout; filled with green colouring matter (*endochrome*).

Measurement. From 8 to 12 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints; and in due time bursting through them.

Habitat. Abundant in Roundstone Bay. Arran. Torquay. Thrown ashore. Very rare generally.

Another most clearly marked species; but, unluckily, extremely rare. The tiny, exactly opposite branchlets, are found on no other British *Cladophora*.

Fig. 296. CLADOPHORA MACALLANA.

Colour. A rich grass-green; fading in the herbarium.

Substance. Rigid; bristling; adhering very imperfectly to paper.

Character of Frond. Thread-like (*filamentous*); jointed; several growing near together and entangled in intricate bundles; excessively branched. Filaments as thick as hogs' bristles throughout; irregularly set with long, very wavy, alternate or rarely opposite branches. Branches re-branched in the same way; more or less clothed with short, back-curved, very wide-spread branchlets, which are either simple, or set on one side like a comb (*pectinated*) with a second set. Tips obtuse.

Joints. Twice or thrice as long as broad throughout; filled with rather dense-green colouring matter (*endochrome*).

Measurement. From 6 to 20 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints; and in due time bursting through them.

Habitat. West of Ireland. Roundstone Bay, &c. On the sandy bottom of the sea, in from four to ten fathoms' water. Obtained by dredging, or thrown ashore.

Like *C. rectangularis* in general appearance; from which, however, its *pectinated,* instead of *opposite* branchlets completely distinguish it.

Fig. 297. CLADOPHORA HUTCHINSIÆ.

Colour. Bluish green, with changeable tints when fresh; fading in the herbarium.

Substance. Rigid; crisp; bristling; but more or less adhering to paper.

Character of Frond. Loose tufts of jointed threads (*filaments*) very much branched. Filaments as thick as hogs' bristles throughout; wavy; several times irregularly divided and branched. Branches distant; spreading; more or less furnished with short, slightly curved branchlets having a few *secund,* one-jointed branchlet*eens* along their inner face. Tips very obtuse.

Joints. About twice as long as broad throughout; the partition-lines (*dissepiments*) contracted; filled with green colouring matter (*endochrome*).

Measurement. From 6 to 8 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.

Habitat. Bantry Bay. Isle of Man, and a few stations on our coasts.

Fig. 298. CLADOPHORA DIFFUSA.

Colour. A dark or full green.

Substance. Generally, rigid and bristling when fresh; occasionally soft. Imperfectly adhering to paper.

Character of Frond. Loose tufts of jointed threads (*filaments*); much branched. Filaments as thick as horse-hair; very waving; distantly set with long, irregularly sub-divided, occasionally forked branches. Branches furnished towards the top with a few *secund*, simple branchlets.

Joints. Three or four times longer than broad; nearly uniform throughout; filled with dark-green colouring matter (*endochrome*); the partition-lines (*dissepiments*) contracted.

Measurement. From 6 to 10 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints; and in due time bursting through them.

Habitat. Our shores generally. On rocks and stones between tide-marks. Not uncommon.

So closely allied to the preceding that it is sometimes impossible to pronounce to which species a specimen should be referred. But those with thicker filaments, and more numerous branchlets, and obtuse tips, may be considered as *C. Hutchinsiæ.*

Fig. 299. CLADOPHORA RUPESTRIS.

Colour. A rich dark green; finest in the deepest water; fading, after a time, in the herbarium.

Substance. Rigid; imperfectly adhering to paper.

Character of Frond. Thick tufts of jointed threads (*filaments*) very much branched. Filaments slender, straight, bushy; set with very upright, rod-like, crowded branches, sometimes re-branched. Branches densely clothed with equally upright, opposite or tufted, rod-like branchlets, which are again re-branchleted; tips pointed. Angles of branching (*axils*) so narrow that the branches lie almost close against the stems whence they spring.

Joints. Three or four times longer than broad; filled with dark-green colouring matter (*endochrome*); in drying, the alternate ones often shrink considerably.

Measurement. From 3 to 6 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints; and in due time bursting through them.

Habitat. Our shores generally. On rocks between tide-marks, and beyond. Very common.

This is another *Cladophora* with decided characters. No one can well mistake it for another species, if the commonest attention be paid to the descriptions given of its growth.

Fig. 300. CLADOPHORA LÆTEVIRENS.

Colour. A pale transparent yellow-green; greyish and without gloss when dry.

Substance. Soft; more or less adhering to paper.

Character of Frond. Dense tufts of jointed threads (*filaments*), very much branched; bushy. Filaments scarcely as thick as horse-hair; closely set with numerous, straight, but spreading, opposite, or irregularly-set branches, which are repeatedly re-branched. Branches often crowded with re-branched branchlets; the last set of which are *secund* and spreading; tips blunt.

Joints. Those of the principal branches long; of the branchlets about twice as long as broad; filled with light-green colouring matter (*endochrome*).

Measurement. From 4 to 8 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints; and in due time bursting through them.

Habitat. Our coasts generally. On rocks, &c. in tide-pools. Very common.

In habit of growth very like *C. glomerata,* which is common in fresh-water streams, and sometimes grows to a greater length than the marine plant. They are supposed by botanists to be the same species under different circumstances of existence.

Fig. 301. CLADOPHORA FLEXUOSA.

Colour. A rather dull green; often half-opaque.

Substance. Somewhat rigid and harsh to the touch, but more or less adhering to paper.

Character of Frond. Loose tufts of jointed threads (*filaments*), very much branched. Filaments very wavy, or angularly bent; clothed more or less closely throughout, with wavy branches of very unequal lengths, alternately or irregularly set. Branches several times divided and re-branched; the last divisions long, spreading, curved, set with delicately slender branchlets, arranged *secund*-wise, like the teeth of a comb, first on one side, then on the other, of the stems; their tips very fine.

Joints. Those of the branches three or four times as long as broad; those of the branchlets twice; filled with green colouring matter (*endochrome*).

Measurement. From 4 to 8 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.

Habitat. Yarmouth. Torquay. Ballycastle. Clontarf, &c. In rock-pools between tide-marks, and in salt-water ditches near Yarmouth. Not uncommon.

In specimens from Clontarf the extreme slenderness of the *secund* branchlets forms quite a mark of distinction.

Fig. 302. CLADOPHORA GRACILIS.

Colour. Bright yellow-green.

Substance. Soft; silky; but adhering imperfectly to paper; fading in the herbarium, but retaining its gloss.

Character of Frond. Dense tufts of jointed threads (*filaments*), very much branched. Filaments long, slender; the main ones entangled together into something of a general stem, from which spring very numerous, long, wavy, angularly twisted branches, plentifully clothed with branchlets; which are much divided and branched; almost tufted; the last set long, slender, *secund,* in rows like the teeth of a comb.

Joints. From three to five times longer than broad, filled with light-green colouring matter (*endochrome*).

Measurement. From 6 to 12 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.

Habitat. Our shores generally. On *Zostera* and the larger algæ in from four to six fathoms' water. Not uncommon.

More luxuriant, more glossy, and more branching than *C. flexuosa.* Less silky, less slender, and less soft than *C. Rudolphiana.*

Fig. 303. CLADOPHORA BALLIANA.

Colour. Grass-green.

Substance. Soft and tender; almost gelatinous, closely adhering to paper.

Character of Frond. Fine tufts of jointed threads (*filaments*), very much branched. Filaments extremely slender; set with long, upright, irregularly alternate branches. Branches excessively divided; the last set upright, rod-like; clothed with remarkably slender, *secund,* one- or two-jointed branchlets. Tips pointed.

Joints. Those of the branches eight or ten times longer than broad; of the branchlets six or eight times; filled with remarkably dense green colouring matter (*endochrome*). Partition-lines (*dissepiments*) broad and transparent.

Measurement. From 6 to 8 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.

Habitat. Clontarf. Miss Ball.

From the enormous length of the joints like no other British *Cladophora* but *C. Rudolphiania,* from which a quite different character of branching separates it.

Fig. 304. CLADOPHORA RUDOLPHIANA.

Colour. Bright yellow-green.

Substance. Extremely soft and silky; almost gelatinous; adhering closely to paper.

Character of Frond. Long tufts of jointed threads (*filaments*), very much branched. Filaments exceedingly slender, inextricably entangled. Branches three-forked (*trichotomous*) or irregular; repeatedly branched; plentifully clothed with branchlets which are much divided and branched, almost tufted; the last set very long and finely drawn out; *secund,* or partly alternate. Tips very fine.

Joints. Those of the main filaments many times as long as broad, here and there swollen. Of the branchlets from six to ten times. The colouring matter in them apt to take a spiral form.

Measurement. From 6 to 20 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.

Habitat. A few stations on our coasts. In Roundstone Bay plentiful. Connemara. Falmouth. On algæ and *Zostera* in from two to six fathoms' water. Very local, therefore rare.

Resembling *C. gracilis* in the great length of the branchlets, but much slenderer and softer. In general appearance and the length of the joints like *C. Balliani,* but much more profusely branched, and differently. Not unlike *C. albida* either; but from this the great length of the joints keeps it as clear as one *Cladophora* can be kept from another. But this is a *genus* abounding in intermediate forms, and, at present, in doubtful distinctions! Perhaps *le bon temps viendra* when these difficulties will be cleared up.

Fig. 305. CLADOPHORA REFRACTA.

Colour. Bright green, sometimes yellowish.

Substance. Rather rigid; bristling; imperfectly adhering to paper.

Character of Frond. Tufts of jointed threads (*filaments*), very much branched. Filaments long; slender; the stems somewhat woven together and ropy. Secondary branches free; spreading on all sides and much divided; densely clothed with short, spreading or back-curved, opposite or alternate branchlets; which are furnished on the inside with a second set arranged like the teeth of a comb (*pectinated*).

Joints. Twice or thrice as long as broad throughout.

Measurement. Three or 4 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.

Habitat. Our coasts generally. In rocky pools left by the tide. Not uncommon.

Nearly allied to *C. albida,* but with coarser and far more rigid filaments; also its last branchlets shorter and more wide-spread (often strongly bent back); and the whole plant by no means spongy.

Fig. 306. CLADOPHORA REPENS.

Colour. Dark green.
Substance. Rigid; spongy.
Character of Frond. Short, dense, cushion-shaped, or globular tufts of jointed threads (*filaments*). Filaments slender; closely matted together; rising from root-like fibres; slightly branched. Branches simple or forked; upright or oddly bent; bare, or clothed with a few distant, *secund* branchlets.
Joints. From ten to twenty times their width; cylindrical throughout; *i. e.* not swollen upwards like those of *C. Brownii;* filled with green colouring matter (*endochrome*).
Measurement. Tufts an inch or 2 in diameter. Filaments scarcely $\frac{1}{2}$ an inch high.
Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.
Habitat. Jersey. Once picked up there after a gale.

Fig. 307. CLADOPHORA NUDA.

Colour. Dark green; or olive when dry.
Substance. Somewhat rigid.
Character of Frond. Loose tufts of jointed threads (*filaments*), sparingly branched. Filaments slender; very straight; here and there forked (*dichotomous*). Branches set with a few scattered, very upright, rod-like, close-lying branchlets; the angles of branching (*axils*) being very narrow. Uppermost branchlets often opposite and long, so that the tips of the branches appear three-forked (not expressed in the plate.)
Joints. Six or eight times longer than broad; filled with green colouring matter (*endochrome*).
Measurement. Two or 3 inches high.
Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.
Habitat. Portstewart. On basalt rocks in the sea. Unknown elsewhere, and only once seen there.

Fig. 308. CLADOPHORA LANOSA.

Colour. Yellow-green; fading pale, and quite without gloss when dry.
Substance. Soft; spongy.
Character of Frond. Short, dense, globular tufts of jointed threads (*filaments*); sparingly branched, forming a circle when laid out. Filaments hair-like; woolly; matted together; throwing out fibres from the lower joints. Branches straight, rod-like, alternate or rarely opposite; set with a few alternate or secund branchlets. Angles of branching (*axils*) very narrow.
Joints. The lower ones twice, the upper six times as long as broad; filled with pale green colouring matter (*endochrome*).
Measurement. An inch high.
Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.
Habitat. Our coasts generally, but prefers the north. Parasitic on various algæ; often on *Polyides rotundus;* occasionally on rocks. Common.

Fig. 309. CLADOPHORA UNCIALIS.

Colour. Yellowish-green; but more grassy than the preceding, and not fading so pale when dry; the tips occasionally bright.

Substance. Soft and spongy.

Character of Frond. Short, dense tufts of jointed threads (*filaments*), sparingly branched. Filaments hair-like; woolly; wavy; the older ones inextricably matted together, but in several thick subdivisions throwing out fibres. Branches irregular; set with a few distant, *secund*, long, spreading or incurved branchlets.

Joints. From two to four times longer than broad; filled with green colouring matter (*endochrome*).

Measurement. An inch high.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.

Habitat. Our shores generally. On rocks near low-water mark. Common.

Fig. 310. CLADOPHORA ARCTA.

Colour. A brilliant, glossy, grass-green when young; olive and dull when old; at "a certain age" olive and dull below; glistening at the tips, which being in fact the youngest shoots of the plant, change last.

Substance. Soft, and retaining water at all times; coarse and very spongy when old.

Character of Frond. Broad, star-like tufts of jointed threads (*filaments*) rising from a wide disc of matted fibres. Filaments as thick as horse-hair; spreading in a circle; much branched. When young, clothed with straight, crowded, very upright, alternate or opposite branches; bearing branchlets of the same character, but often *secund* branchlets. When old, matted into rope-like bundles below, by root-like fibres from the joints; the upper branchlets only free.

Joints. Extremely variable in length; the lower, however, generally only once or twice as long as broad, the upper many times longer; filled with green colouring matter (*endochrome*).

Measurement. From 2 to 4 inches high.

Fructification. As before.

Habitat. Our coasts generally. On rocks from half-tide level to low-water mark. Common.

Fig. 311. CLADOPHORA GLAUCESCENS.

Colour. A bright but scarcely grass-green; varying, however, in different specimens.

Substance. Soft and rather silky; having a speckled, shimmering look when dry, and seen through a pocket lens.

Character of Frond. Dense tufts of jointed threads (*filaments*), excessively branched. Filaments very wavy; hair-like (but not so slender as those of *C. refracta*), furnished with straight, erect, alternate branches, several times re-branched; the lesser ones closely set with very upright, long, finely drawn out, alternate or secund branchlets.

Joints. About three times as long as broad; nearly uniform throughout; filled with green colouring matter (*endochrome*).

Measurement. Two or 3 inches long, generally; but occasionally up to 6.

Fructification. As before.

Habitat. Our coasts generally. On rocks and stones between tide-marks. Common.

Fig 312. CLADOPHORA MAGDALENÆ.

Colour. A dark, dingy green.
Substance. Somewhat rigid; not adhering to paper in drying.
Character of Frond. Short, hair-like; jointed threads (*filaments*) matted together; entangled among the bases of other algæ. Filaments bent, straggling, almost distorted, irregularly forked; with very wide angles of branching (*axils*). Branches curved; wide-spread; set with a few forked or *secund* branchlets, which are quite as thick as the stems whence they spring.
Joints. Three or four times longer than broad; filled with very dense, dark-green colouring matter (*endochrome*); the partition-lines (*dissepiments*) very narrow; not contracted.
Measurement. One inch long.
Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.
Habitat. Jersey. One specimen.

Fig. 313. CLADOPHORA GATTYÆ.

Colour. A dull, dirty olive-green.
Substance. Rather rigid; not adhering to paper.
Character of Frond. Short jointed threads (*filaments*) densely matted together in ropy tufts. Filaments coarsely hair-like; irregularly branched; somewhat forked; set with a few simple, wide-spread branchlets. Angles of branching (*axils*) rounded.
Joints. About once and a half as long as broad; very uniform throughout; filled with dull green or olive colouring matter (*endochrome*). Partition-lines (*dissepiments*) very narrow; contracted.
Measurement. One inch long.
Fructification. As before.
Habitat. Uncertain between Hastings and Filey. One specimen.

Fig. 314. CLADOPHORA FLAVESCENS.

Colour. Pale yellow; glossy when dry.
Substance. Soft; silky; not adhering to paper.
Character of Frond. Very slender jointed threads (*filaments*) growing in long, entangled tufts in pools and ditches, where it rises at last to the surface, forming a floating fleece intermixed with large air-bubbles. Filaments sparingly branched in a partly forked, partly alternate manner. Branches long, upright, wide-spread; set with scattered, alternate, or *secund* branchlets.
Joints. Eight or nine times longer than broad; filled with light yellow colouring matter (*endochrome*), never very dense. Partition-lines (*dissepiments*) contracted.
Measurement. Indefinite.
Fructification. As before.
Habitat. In pools and ditches of brackish or fresh water. In a fountain-pond in the Montpelier Gardens, Harrowgate. Not uncommon.

Fig. 315. CLADOPHORA FRACTA.

Colour. A dullish green; more or less light or dark.
Substance. Rigid; not adhering to paper.
Character of Frond. Coarse jointed threads (*filaments*) growing in long entangled tufts in pools and ditches, where it rises at last to the surface, forming a floating fleece. Filaments distantly branched; the lesser branches somewhat forked, and spreading with very wide angles of branching (*axils*). Branchlets few, alternate, or often *secund.*
Joints. Very irregular in length. From three to six times as long as broad; different lengths intermixed; filled with dense, full-green colouring matter, which, under the microscope, is evidently formed into little grains (*granules*).
Measurement. Indefinite.
Fructification. As before, except that here and there, when well developed, the *zoospores* fill the joints entirely, so that these become in fact a string of fruit-cells (*sporangia*). This is usually observed about the middle of the frond.
Habitat. In pools and salt-water ditches as well as in inland lakes.

Fig. 316. RHIZOCLONIUM RIPARIUM.

Colour. Light, bright yellow-green (sometimes darker); fading very dull in the herbarium.
Substance. Soft and delicately woolly; a peculiarity it retains in the herbarium.
Character of Frond. Long, slender, jointed threads (*filaments*) lying flat on the sides of rocks, clothing them with a fine close fleece. Filaments entangled; here and there angularly bent, and sending out from the angles short, horizontal, thorn-like, jointed fibres, which rarely lengthen into true branchlets containing colouring matter (*endochrome*).
Joints. From two to four times longer than broad.
Measurement. From 1 to 3 inches long.
Fructification. As before, in the genus *Cladophora.*
Habitat. Our coasts generally. (Filey). On broad faces of sandy rocks near high-water mark. Not uncommon.

Fig. 317. CONFERVA ARENICOLA.

Colour. Pale yellow-green.
Substance. Soft; delicate.
Character of Frond. Extremely fine, jointed threads (*filaments*) matted together; creeping; forming a thin fleecy web on the ground. Filaments as slender as human hair throughout; crisped; wavy; unbranched.
Joints. Once and a half as long as broad, when old enough to be observed; filled with green colouring matter (*endochrome*), which at last contracts into a dark mass in the centre, leaving the rest of the cell pellucid. When young, the threads appear a uniform colour throughout, varied only by a few scattered dots.
Measurement. Indefinite.
Fructification. As before, in the genus *Cladophora.*
Habitat. "On the sandy margins of pools in a salt-marsh periodically flooded." Rev. M. J. Berkeley.

PLATE LXVIII.

Fig. 318. RHIZOCLONIUM CASPARYI.

Colour. Light, bright yellow-green; fading very dull in the herbarium.

Substance. Soft and delicately woolly; a peculiarity it retains in the herbarium.

Character of Frond. Long, very slender, jointed threads (*filaments*) lying flat on the sides of rocks, clothing them with a fine close fleece. Filaments entangled, curved, here and there angularly bent; and sending out from the angles short, horizontal, thorn-like, jointed, colourless fibres, which sometimes lengthen into true branchlets, containing colouring matter (*endochrome*).

Joints. From two to six times longer than broad.

Measurement. From 1 to 3 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.

Habitat. Falmouth, and Penzance.

It will be seen, by comparing the descriptions, that except in the greater slenderness of the threads, and occasionally greater length of the joints, there is no difference between this plant and *R. riparium.* And Dr. Harvey says that joints of different lengths are sometimes found even on the same threads.

Fig. 319. CONFERVA TORTUOSA.

Colour. Pale, full, or dark green, in different specimens.

Substance. Rigid.

Character of Frond. Slender, closely-interwoven, jointed threads; (*filaments*); forming a fleecy web upon rocks or algæ. Filaments about the thickness of horse-hair; very much and stiffly curled and twisted; unbranched.

Joints. Twice or thrice longer than broad; filled with green colouring matter (*endochrome*).

Measurement. The fleecy web from an inch to several feet in diameter.

Fructification. As before in *Rhizoclonium* (and *Cladhophora*). See under Fig. 318.

Habitat. Our shores generally. On rocks and algæ at half-tide level. Very common.

Fig. 320. CONFERVA IMPLEXA.

Colour. Bright green.

Substance. Soft and delicate.

Character of Frond. Very slender, densely-interwoven, jointed threads; forming a fleecy web upon rocks; or little tufts among the branches of other algæ. Filaments as fine as human hair (half the thickness of *C. tortuosa*); entangled but not stiffly twisted; unbranched.

Joints. About as long as broad; or a trifle longer.

Measurement. Indefinite, from half an inch to a foot.

Fructification. As before.

Habitat. Our coasts generally. On rocks and algæ between tide marks. Not uncommon.

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Fig. 321. CONFERVA ARENOSA.

Colour. Pale green.

Substance. Rigid and harsh for such very slender threads.

Character of Frond. Very slender, interwoven jointed threads (*filaments*), spreading in long, thin, fleecy webs, several of which lie, one on the top of another, like folds of gauze, and can be easily separated. Filaments finer than human hair, when young; when old, exceedingly rough, and apt to be swollen and lumpy (*tubercular*) here and there.

Joints. From three to five times longer than broad; filled with green colouring matter (*endochrome*), which, when old, contracts into a variety of odd shapes.

Measurement. The fleecy webs a yard or more in extent. Filaments 5 or 6 inches long.

Fructification. As before.

Habitat. Appin. Bantry Bay. On the flat sandy shore, about half-tide level.

Fig. 322. CONFERVA LITTOREA.

Colour. Dull green.

Substance. Rigid and brittle.

Character of Frond. Coarse, loosely-interwoven, jointed threads (*filaments*) forming extensive bundles in salt-water ditches and on muddy sea-shores. Filaments as thick as hogs' bristles; variously curved; unbranched.

Joints. Once and a half as long as broad; here and there swollen in pairs and discoloured (see Figure); filled with dense green colouring matter (*endochrome*); the minute grains (*granules*) which compose it visible under a moderate magnifying power.

Measurement. Indefinite.

Fructification. As before.

Habitat. Salt-water ditches, estuaries, and muddy sea-shores; between tide-marks. Not uncommon.

Fig. 323. CONFERVA LINUM.

Colour. Light or deep glossy green, according to age. When very old, very dingy and dull.

Substance. Very rigid and brittle when fresh; soon becoming flabby in the air.

Character of Frond. Long, very coarse, loosely-entangled jointed threads (*filaments*) spreading in fleecy masses in salt-water ditches. Filaments *twice* as thick as as hogs' bristles (!); very harsh; very much curled; unbranched.

Joints. As long as broad; or narrower; filled with green colouring matter (*endochrome*), which often takes a rounded form (see figure of a magnified bit).

Measurement. Filaments many feet long. The fleecy mass spreading indefinitely.

Fructification. As before.

Habitat. Salt-water ditches near the coast. Very abundant in those by the north wall, Dublin.

Often called by Agardh's name, *C. crassa.* Dr. Harvey includes several supposed separate species under the name *C. linum.* For other *Confervas,* see Plate LXX.

Fig. 324. CLADOPHORA ALBIDA.

Colour. Pale, or sometimes bright light green; whitish, and generally without gloss, when dry.

Substance. Soft, silky, and very spongy; retaining water and swelling with it; soft to the touch when dry.

Character of Frond. Fine tufts of jointed threads (*filaments*) excessively branched. Filaments slenderer than human hair; crowded with long irregular branches, spreading on all sides, and several times re-branched; the upper branches straight; spreading; often opposite. These set with straight, upright, short, opposite, or *secund* branchlets; one issuing from each joint, and occasionally bearing a second set.

Joints. Four or five times longer than broad; filled with light green colouring matter (*endochrome*).

Measurement. From 2 to 6 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.

Habitat. Southern shores of England and Ireland. On rocks and algæ between tide-marks, usually near low-water mark. Not uncommon.

This *Cladophora* approaches nearest to *C. refracta* in appearance; but it is a much taller plant when well grown. Moreover, it is distinctly *spongy*, which *C. refracta* is not; and it has a peculiarly soft woolly feeling when dry, which distinguishes it from all the genus but *C. lanosa*.

Fig. 325. CLADOPHORA FALCATA.

Colour. A peculiarly rich, glossy green.

Substance. Rigid; but adhering to paper in drying.

Character of Frond. Dense tufts of jointed threads (*filaments*), very much branched. Filaments thicker than human hair; nearly uniform throughout; entangled at the base; irregularly divided; much curved. Branches zigzag; curved and twisted all ways; repeatedly forked. The last divisions crowded; three or four springing together from a stem. These all strongly arched in one direction, like a set of curled feathers; their inner faces clothed with branchlets; some short and blunt; some longer and re-branchleted.

Joints. Three or four times longer than broad; filled with dense green colouring matter (*endochrome*).

Measurement. Three or 4 inches long.

Fructification. As before.

Habitat. Dingle Harbour, Kerry. Jersey. On the bottoms of clear rock-pools near low-water mark. Not common.

Fig. 326.a CONFERVA ÆREA.

Colour. A beautiful yellow-green; fading in the herbarium to a dirty white.

Substance. Harsh and brittle; but unable to support itself when removed from the water.

Character of Frond. Long, upright, unbranched, jointed threads (*filaments*), as thick as hogs' bristles; growing in tufts from a disc-like root.

Joints. About as long as broad, generally; occasionally longer; visible to the naked eye; filled with green colouring matter (*endochrome*), which in drying runs close up to the partitions (*dissepiments*) leaving the middle empty.

Measurement. From 3 to 12 inches long.

Fructification. As before in *Cladophora.*

Habitat. Our coasts generally. On sand-covered rocks between tide-marks. Frequent.

Resembling *C. Melagonium,* but more tufted; softer; and not nearly so stiff.

Fig. 326.b CONFERVA MELAGONIUM.

Colour. Dark green.

Substance. Stiff; wiry; rigid.

Character of Frond. Long, upright, unbranched, jointed threads (*filaments*), thicker than hogs' bristles; a few (sometimes but one) growing together from a disc-like root.

Joints. Twice as long as broad, filled with dark green colouring matter (*endochrome*). Partition-lines (*dissepiments*) somewhat contracted; very narrow.

Measurement. From 5 to 8 inches high.

Fructification. As before.

Habitat. Our coasts generally. On rocks at low-water mark. Not common anywhere.

Springs occasionally in an aquarium.

Fig. 327. CONFERVA COLLABENS.

Colour. A splendid glossy, verdigris-green.

Substance. Soft; gelatinous; flabby; slippery.

Character of Frond. A large tuft of long, straight, jointed threads (*filaments*), unbranched; growing from a piece of deal. Filaments of extraordinarily various thicknesses.

Joints. From once to once and a half as long as broad; at first filled with a very dense green colouring matter (*endochrome*), which afterwards contracts into a dark spot in the centre.

Measurement. Three or 4 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, collected into a round central mass (*sporidium*), which in due time bursts out.

Habitat. Once found upon floating timber on the beach at Yarmouth.

Now *Hormotrichum collabens.*

Fig. 328. CONFERVA BANGIOIDES.

Colour. Dark and very glossy green.

Substance. Very gelatinous; soft; sticky.

Character of Frond. Long, dense tufts of close-clinging, slender, wavy, jointed threads (*filaments*), unbranched. Filaments rather finer than horse-hair.

Joints. About twice as long as broad; at first quite filled with light green colouring matter (*endochrome*), which afterwards contracts into a dark green spot in the centre.

Measurement. From 3 to 6 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, collected into a round central mass (*sporidium*), which in due time bursts out.

Habitat. Breakwater, Plymouth. Torquay. Port Ballantoae, N. Ireland. On rocks, &c. near low-water mark.

Now *Hormotrichum bangioides.* Like, but larger and longer than *C. Youngana.* Easily known from most *Confervas* by its glossiness and soft gelatinous feel. From *C. collabens* by its quite different colour. For other *Confervas* see Plate LXXII. It should be observed that such *Confervas* (and *Lyngbyas*) as have been removed to the genus *Hormotrichum* are remarkable for their soft, gelatinous substance, the shortness of their joints, and the contraction of their *endochrome*, at maturity, into a central spot.

Fig. 329. ENTEROMORPHA INTESTINALIS.

Colour. A full green; but apt to fill with sand or dirt, and become discoloured. Fading to yellow and white.

Substance. Membranaceous; thin.

Character of Frond. Cylindrical; tubular; unbranched; inflated like a delicate green bag; widening upwards to a round broad end; tapering to a mere thread at the base; more or less wrinkled and curled throughout; several rising from a minute root; attached, therefore, at first, but afterwards floating.

Measurement. Often 2 feet or more long, but sometimes not more than an inch. Of every width between $\frac{1}{10}$ of an inch and 3 inches.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the cells of which the frond-membrane is composed; and in due time bursting through them.

Habitat. Our coasts generally. In brackish ditches also; and occasionally in inland waters. In a pond in the kitchen-garden at Bishopthorpe Palace, York. Very common.

Narrow forms resemble *E. compressa*, but there is an unfailing rule for knowing them apart. *E. compressa* is always *some*what branched, however little. *E. intestinalis* is always perfectly simple.

Fig. 330. ENTEROMORPHA COMPRESSA.

Colour. A pleasant, bright grass-green; fading pale, yellow, and white.

Substance. Membranaceous; thin.

Character of Frond. Cylindrical or somewhat compressed; occasionally thread-like (*filamentous*); tubular; more or less branched. Branches alternate; widening gradually upwards; blunt at the tips; tapering to a mere thread at the base; sometimes simple, sometimes re-branched again and again. Occasionally contracted at intervals as if tied in. Tips blunt throughout.

Measurement. From ¼ of an inch to 12 inches long. Of every width from a *hairsbreadth* to ½ of an inch.

Fructification. As in the preceding.

Habitat. On every coast everywhere. In brackish ditches also, and occasionally in inland waters. In a large sheet—almost a lake—in Clomber Park. Very common.

Varying as this plant does in size, amount of branching, and bushiness, it may always be recognised among other *Enteromorphas* by the blunt tips and tapering bases of its branches. In one curious variety the stems are one-sixth of an inch wide, fringed all over with hair-like branchlets.

Fig. 331. ENTEROMORPHA LINKIANA.

Colour. A very pale green.

Substance. Membranaceous, but firm; rigid when dry.

Character of Frond. Thread-like (*filamentous*); cylindrical; tubular; inflated; rising with a main stem, set with branches on every side. Branches long, slender, between erect and spreading, tapering to the tips; re-branched with a second similar set, only finer; these with a third, quite hair-like. Tips pointed throughout.

Measurement. From 6 to 12 inches long.

Fructification. As before.

Habitat. Appin; once found.

The microscopic characters of this plant are very like those of *E. clathrata*, *E. erecta*, and *E. ramosa*. The branches are wider, however, than those of *E. clathrata*, and it has not the thorny branchlets of any of the three.

Fig. 332. ENTEROMORPHA ERECTA.

Colour. A pleasant, light grass-green.

Substance. Membranaceous; thin; soft.

Character of Frond. Thread-like (*filamentous*); cylindrical; tubular; rising with a (generally) undivided main stem, closely set with opposite or alternate undivided branches; the lowermost longest; all tapering at the tips. Branches clothed throughout with short, slender, almost hair-like, spreading branchlets, which give the plant a feathery appearance. All the tips finely pointed.

Measurement. From 4 to 8 inches long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the cells of which the frond-membrane is composed; and in due time bursting through them.

Habitat. Our coasts generally. On rocks and in pools between tide-marks. Not uncommon.

The above description applies to the strictly characteristic specimens of the species; so called *typical forms*, that is. But intermediate ones abound, which are neither exactly *E. erecta*, nor yet *E. clathrata*, *ramulosa*, or *Linkiana*, but combinations from them; and Dr. Harvey is of opinion that these four species are but one, under different circumstances of growth. For the present, however, the variations take rank as typical characters; and all that a collector can do, is to place his *intermediates* in the set they come nearest to, on the whole. He cannot go far wrong so long as he keeps those with pointed tips clear of those with blunt ones. In the Nereis Boreali-Americana, *E. erecta* and *E. ramulosa* are referred to *E. clathrata.*

Fig. 333. ENTEROMORPHA CLATHRATA.

Colour. A delicate grass-green.

Substance. Membranaceous; thin; soft.

Character of Frond. Thread-like (*filamentous*); cylindrical; tubular; bushy; rising with a (generally) undivided main stem, closely set with branches on every side; all tapering to the tips; occasionally interwoven and spreading in fleeces. Branches several times re-branched; everywhere thickly clothed with short, hair-like, wide-spread, or back-curved branchlets. All the tips finely pointed.

Measurement. From 2 to 12 inches long.

Fructification. As before.

Habitat. Our coasts generally. On rocks between tide-marks. Not uncommon.

Distinguished from *E. ramulosa* by its greater slenderness, softness, and more profuse branching.

Fig. 334. ENTEROMORPHA RAMULOSA.

Colour. A full grass-green.

Substance. Membranaceous, but harsh feeling; the thorn-like branchlets bristling when the plant is lifted from the water.

Character of Frond. Thread-like (*filamentous*); rather compressed than cylindrical; tubular; much branched, twisted and interwoven; when old, spreading in fleeces. Main stems long, wavy; set with branches on every side; spreading all ways; all tapering to the tips. Branches re-branched; everywhere covered with very short, thorn-like, horizontal branchlets. All the tips finely pointed.

Measurement. From 2 inches to a foot or two long.

Fructification. As before.

Habitat. Our coasts generally. On rocks between tide-marks. Not uncommon.

Characteristic, really *thorny* specimens are very pretty, and easy to distinguish by their bristling crispness and full green hue. Dr. Harvey describes it as spreading widely in fleecy masses in its old age, and thus "forming a comfortable cover for a variety of small crustacea and shell-fish, who, no doubt, feel it quite their own."

Fig. 335. ENTEROMORPHA HOPKIRKII.

Colour. A pleasant light green.

Substance. Membranaceous; thin; very soft.

Character of Frond. Long tufts of ultra-fine-hair-like (*byssoid !*) cylindrical, tubular threads (*filaments*), excessively branched. Main divisions long, wavy, tapering to the tips. Branches upright; opposite or alternate; repeatedly divided; springing from all sides; set profusely with minute cobwebby branchlets; all the tips finely pointed.

Measurement. From 6 to 12 inches long.

Fructification. As before.

Habitat. Carrickfergus. Goodington. Torbay. Dredged in from four to ten fathoms' water. Rare.

As delicate as the most delicate of the *Cladophoras.* Under the microscope, remarkable for the large size of cells of which the frond is composed; and that these are empty, all but a minute grain of bright green colouring matter (*endochrome*) in the middle. As the branchlets are formed of only *one* row of these cells, they appear to be jointed like those of a *Cladophora.*

Fig. 336. CONFERVA SUTORIA.

Colour. Dark green.
Substance. Soft.
Character of Frond. Thread-like (*filamentous*); jointed; forming floating and loosely entangled fleeces in ditches and pools. Filaments almost the thickness of a hog's bristle, equal throughout; very long, wavy, unbranched.
Joints. Once and a half as long as broad; filled with green colouring matter (*endochrome*).
Measurement. Indefinite.
Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, and in due time bursting through them.
Habitat. Wisbeach, &c. In ditches and pools subject to the influence of the tides; sometimes found growing with *C. Linum.*

Like *C. Linum* but a much slenderer plant, with longer proportioned joints.

Fig. 337. CONFERVA YOUNGANA.

Colour. Grass-green; not glossy when dry; fading to a dull brownish orange in the herbarium.
Substance. Soft, but firm. Rather woolly to the touch when dry.
Character of Frond. Short (or sometimes long), dense tufts of jointed threads (*filaments*), spreading over the surface of rocks and wood-work. Filaments as fine as human hair; straight, or nearly so; clinging together; unbranched.
Joints. Very variable in length. Generally once and a half as long as broad, but sometimes twice as long, and sometimes only half; at first, quite filled with dense, bright green endochrome, which afterwards contracts into a dark spot in the centre.
Measurement. One or 2 inches high.
Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, collected into a round central mass (*sporidium*), which in due time bursts out.
Habitat. Our coasts generally. Near Dunraven Castle. Filey, &c. Not uncommon.

Now *Hormotrichum Younganum.* See under Figure 328.

Fig. 338. OCHLOCHÆTE HYSTRIX.

Colour. Pale green.
Substance. Harsh, for so *infinitesimally*-sized a plant!
Character of Frond. A minute hairy patch formed of jointed threads (*filaments*), radiating from a centre, and so forming a round dot. The filaments somewhat branched, and usually sending up long, stiff, transparent, unjointed bristles from almost every joint.
Measurement. A homœopathic globule!
Fructification. Unknown.
Habitat. In brackish water near the coast; and sometimes in inland ditches, on stems of grasses, leaves of mosses, &c. Very rare.

The plate is incorrect in representing the bristles as *green,* they are colourless and transparent.

Fig. 339. ENTEROMORPHA CORNUCOPIÆ.

Colour. Dark green below; pale above.
Substance. Membranaceous; thin.
Character of Frond. Tubular, inflated, bag-like, widening suddenly upwards from a thead-like base; by degrees spreading at top like a funnel, and finally torn and open.
Measurement. About an inch high.
Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the cells of which the frond-membrane is composed, and in due time bursting through them.
Habitat. On corallines in rocky pools left by the tide. Not "generally observed."

So very like a dwarf variety of *E. intestinalis*, that Dr. Harvey hesitates about it. The species was constituted by a well-known algologist now dead, and for the present stands.

Fig. 340. ENTEROMORPHA PERCURSA.

Colour. Bright grass-green; fading when dry.
Substance. Membranaceous; soft.
Character of Frond. Entangled tufts of very slender (almost hair-like) threads (*filaments*) spreading widely on oozy shores. Filaments nearly solid, but just tubular, so as to keep up the character of an *Enteromorpha;* rather more twisted than in *E. Ralfsii;* simple and unbranched, or bearing (rarely) a few short, slender, spine-like branchlets.
Measurement. Several inches long. Two or more (but generally only two) cells forming its almost hairsbreadth width. The cells small (compared with those of *E. Ralfsii*); square; the colouring matter (*endochrome*) nearly filling them, and being subdivided into four infinitesimal portions.
Fructification. As before.
Habitat. On muddy sea shores above half-tide level.

These last two figures are misplaced on the plate.

Fig. 341. ENTEROMORPHA RALFSII.

Colour. Bright grass-green; fading when dry.
Substance. Membranaceous; soft.
Character of Frond. Entangled tufts of very slender (almost hair-like) threads (*filaments*) spreading widely on oozy shores. Filaments nearly solid, but just tubular; so as to keep up the character of an *Enteromorpha*; simple and unbranched, or bearing a few short, slender, spine-like branchlets.
Measurement. Several inches long. From 2 to 4 cells forming its almost hairsbreadth width! The cells large (compared to those of *E. percursa*); oblong, transparent; each containing a central grain of bright green colouring matter (*endochrome*).
Fructification. As before.
Habitat. On muddy sea-shores above half-tide level. Mr. Ralfs.

The characters which separate this plant from *E. percursa* are *microscopic*, in more senses than one, as a comparison of the descriptions will show. In *E. Ralfsii* the *endochrome* forms a minute dot in the centre of a transparent cell; in *E. percursa* it is a square mass, and nearly as large as the cell itself. See Figs. 340 and 341.

Fig. 342. ULVA LATISSIMA.

Colour. A full, bright green; darker from deep water; fading pale; sometimes turning brown in drying.

Substance. Membranaceous; but quite crisp when fresh.

Character of Frond. A ribless expansion of very irregular shape; broad or oblong; simple or divided; wavy or flat; often plaited; one or more growing together from one base.

Measurement. From 6 inches to 2 feet long; from 3 to 12 inches wide.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the cells of which the frond-membrane is composed; and in due time bursting through them.

Habitat. Our coasts generally. On rocks, &c. between tide-marks. Very common.

Called "green laver," in contradistinction to the *purple* laver (*Porphyra laciniata*). Some authors call this species *Phycoseris latissima;* thus separating it from the true *Ulvas.* which have the frond-membrane composed of only *one* layer of little cells (*cellules*); whereas that of *Ulva latissima* is composed of *two.* Dr. Harvey, however, retains both under the genus *Ulva*, but points out the difference. This is only to be ascertained by dissection and examination under a microscope; but as a membrane with two cells is naturally thicker than those with but one, the firmer texture forms a distinguishing mark between this plant and the following.

Fig. 343. ULVA LACTUCA.

Colour. A pleasant light green, fading to yellowish; sometimes darker when young.

Substance. Delicately membranaceous; almost transparent; somewhat gelatinous; thin.

Character of Frond. When young, a puckered inflated bag; afterwards bursting, and opening out into a flat, ribless, wavy or torn, more or less rounded expansion.

Measurement. From 3 to 6 inches long, and as much wide.

Fructification. As before.

Habitat. Our coasts generally. On rocks, &c. between tide-marks. Not so common as *U. latissima.*

This is a true *Ulva*, the frond-membrane being composed of only one layer of little cells (*cellules*).

Fig. 344. ULVA LINZA.

Colour. A fine grass-green, fading in the herbarium.

Substance. Membranaceous; soft and thin.

Character of Frond. A long, narrow, ribless, leaf-like expansion, with curled and wavy margins; either blunt or pointed at top, always tapering to the base.

Measurement. From 6 inches to 2 feet long; from ½ inch to 2 inches wide.

Fructification. As before.

Habitat. Our coasts generally. On rocks, &c. at half-tide level. Not uncommon.

The structure of the *Ulva* has another peculiarity. It is formed of *two* membranes (each *one* cell thick) so closely laid together, that their existence as two can only be ascertained by microscopic investigation.

Fig. 345. PORPHYRA LACINIATA.

Colour. Dull purple when growing; occasionally greenish; becoming bright and very glossy when steeped in fresh water and afterwards laid out and dried.

Substance. Delicately membranaceous; sometimes extremely thin; sometimes thicker and firmer.

Character of Frond. A flat, broad, ribless expansion; sometimes irregularly divided, or torn; sometimes growing in an irregular circle from a central root. One or more from one base.

Measurement. From 4 to 8 inches or more across.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the cells (four together) of which the frond-membrane is composed; and in due time dropping out.

Habitat. Our coasts generally. On rocks, &c. within the range of the tide. Common.

This is the *laver* sold in jars in the shops, and is a great delicacy when stewed and eaten hot with lemon-juice. But it should be served up like Hans Andersen's white snails, in a silver dish with a spirit-lamp underneath. It is called *sloke,* or *slokaun,* in Scotland and Ireland, where it is often gathered for food under that or some other odd name. At Miltown Malbay and Kilkee, it is called "*libberum.*"

Fig. 346. PORPHYRA VULGARIS.

Colour. Bright purple; almost rosy when dry; very glossy.

Substance. Delicately membranaceous; very thin.

Character of Frond. A flat, narrow, ribless, leafy expansion, with a pointed end. Quite simple; but the margins becoming more or less strongly waved and plaited as the plant grows.

Measurement. From an inch to 1 or 2 feet long. Not more than 3 inches wide, and young specimens mere threads.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the cells of which the frond-membrane is composed (four in each cell); and in due time dropping out.

Habitat. Our coasts generally. On rocks, &c. between tide-marks; from high-water mark downwards.

It is almost "past a peradventure" that this plant is but a different condition of the preceding one, *Porphyra laciniata* (see last Plate). The narrowest of the specimens in Fig. 346 are found in winter or early spring covering the rocks near high-water mark with their tiny, purplish-pink, satiny fronds. Later in the season, the larger, frilled form abounds in the same locality, as also lower on the shore, where it may be found mixed with the broad divided fronds of *P. laciniata*. All are gathered indiscriminately for the table. *P. vulgaris* is rarely so dull coloured and greenish as *P. laciniata* often is; but, on the other hand, *P. laciniata* is *some*times as bright as the other ever is. And intermediate instances both in form and colour are met with. Dr. Harvey unites the species in his Nereis Boreali-Americana, under the name *laciniata*.

Fig. 347. BANGIA FUSCO-PURPUREA.

Colour. Blackish-purple; occasionally greenish; glossy.

Substance. Tenacious; soft; sticky.

Character of Frond. Tufts of hair-like threads (*filaments*); forming a close-clinging, dark purple or greenish layer upon rocks. Filaments straight or slightly curled; undivided; unbranched; tubular; containing rows of minute colour-cells radiating from the centre.

Measurement. Filaments, several inches long; their width variable; narrow ones containing only one colour-cell; others from 2 up to 5; these forming (with the intervals) a tesselated line across (see Figure for magnified appearance of this strictly microscopic object.)

Fructification. Minute seeds (*zoospores*) formed of the colour-cells in the filaments (one to each cell); and in due time dropping out.

Habitat. Our coasts generally, and in fresh-water rivers and canals. On rocks, wood, &c. near high-water mark. Not uncommon.

Fig. 348. BANGIA CILIARIS.

Colour. A rosy pink.

Substance. Gelatinous; but scarcely tangible!

Character of Frond. A scarcely perceptible fringe of delicately hair-like, jointed threads (*filaments*), parasitic on other algæ. Filaments slightly tufted, or growing close together; straight; compressed; unbranched; swollen here and there; tubular; containing rows of minute colour-cells, set as if radiating from the centre (a microscopic object).

Measurement. From $\frac{1}{10}$ to $\frac{1}{5}$ of an inch long. From 2 to 3 colour-cells in width; these forming (with the intervals) a tesselated line across (see Figure).

Fructification. As in the preceding; only with two *zoospores* to each cell.

Habitat. Appin. Filey, &c. On *Zostera marina*, and various small algæ near low-water mark. Not uncommon.

Fig. 349. BANGIA CERAMICOLA.

Colour. A purplish rose colour.

Substance. Gelatinous; soft.

Character of Frond. A delicate fringe of fine, hair-like, jointed threads (*filaments*) parasitic on other algæ. Filaments tufted or growing close together; unbranched; their joints once or twice as long as broad; slightly contracted at the partition-lines (*dissepiments*); marked with several slender, upright lines (internal colour-cells showing through), which at maturity run together (a microscopic object).

Measurement. About an inch long.

Fructification. Minute seeds (*zoospores*) formed of the line-like colour-cells in the joints; which cells then run together, and at last form a globular mass, that bursts through the cell-wall, leaving the cell empty.

Habitat. Appin. Largs, &c. On the smaller algæ in tide-pools.

Unlike other *Bangias* in structure. Moreover, much longer than *B. ciliaris.*

Fig. 350. BANGIA ELEGANS.

Colour. Rosy pink.

Substance. Soft, but scarcely tangible.

Character of Frond. A delicate fringe of fine, hair-like, jointed threads (*filaments*) parasitic on other algæ. Filaments tufted, or growing close together; repeatedly forked; the angles of branching (*axils*) rounded and very wide; tubular; containing narrow, cylindrical colour-cells, which at maturity run together (a microscopic object).

Measurement. From $\frac{1}{10}$ to $\frac{1}{5}$ of an inch long

Fructification. Minute seeds (*zoospores*) formed of the colour-cells in the filaments; which cells then run together into diamond-shaped masses, and at last drop out.

Habitat. Strangford Lough. Parasitic on the smaller algæ. Very rare.

This plant also differs entirely in structure from true *Bangias*, and will probably one day be removed to a separate genus.

PLATE LXXV.

Fig. 351. RIVULARIA PLICATA.

Colour. Dark green.
Substance. Smooth; fleshy; slimy.
Character of Frond. Small, rounded, but irregular lumps; several growing together in a mass; formed of closely-packed threads (*filaments*) radiating from a centre. At first solid; afterwards hollow and bursting.
Internal Filaments. Tubular; containing very narrow, cylindrical colour-cells, which show through, with division-lines; not branched, but lying against each other as if they were; a globular cell at the bottom of each (a microscopic object).
Measurement. The patches indefinite; each frond from $\frac{1}{10}$ to $\frac{1}{2}$ an inch wide.
Fructification. Minute seeds (*zoospores*) formed of the colour-cells in the filaments; which cells then separate from each other and drop out.
Habitat. Our coasts here and there. On rocks near high-water mark. Not uncommon.

Duller, darker coloured, and smaller than *R. nitida.*

Fig. 352. RIVULARIA ATRA.

Colour. Glossy black.
Substance. Hard; fleshy; smooth.
Character of Frond. Very minute, bead- or drop-like lumps; scattered, not massed together; formed of densely-packed threads (*filaments*) radiating outwards. Always solid.
Internal Filaments. Tubular; containing cylindrical colour-cells of various lengths, which show through, with division-lines; not branched, but lying against each other as if they were; a globular cell at the bottom of each (a microscopic object.)
Measurement. Scarcely ever as large as a sweet-pea seed; generally smaller.
Fructification. As in the preceding.
Habitat. Our coasts generally. On rocks, stones, and algæ between tide-marks. Not uncommon.

Fig. 353. RIVULARIA NITIDA.

Colour. A shining deep green; sometimes verdigris when dry.
Substance. Leathery, but gelatinous; slippery feeling.
Character of Frond. Irregularly round, more or less distorted balls; several often rising together from a lumpy patch; formed of threads (*filaments*) radiating from a centre; the inner ones loosely, the outer closely packed. When young compressed and filled with gelatine; when old, hollow and distended.
Internal Filaments. Tubular; containing narrow cylindrical colour-cells, which show through, with division-lines; not branched, but lying against each other as if they were; a globular cell at the bottom of each (a microscopic object).
Measurement. From $\frac{1}{2}$ an inch to an inch across.
Fructification. As before.
Habitat. Southern shores of England. Isle of Man. South and west of Ireland. On rocks at half-tide level. Plentiful where it occurs.

Fig. 354. SCHIZOSIPHON WARRENIÆ.

Colour. Dark green.

Substance. Soft; fleshy; slimy.

Character of Frond. Roundish, irregularly-spreading lumps, running together, and forming a glazy crust upon rocks; formed of closely-packed threads (*filaments*) radiating from a centre.

Internal Filaments. Tubular; containing cylindrical colour-cells, which show through; set in wide transparent sheaths, composed of innumerable upright, hair-like gelatinous shreds; so closely set as to look entire, all but the tips. A nearly globose cell at the bottom of each (a microscopic object).

Measurement. The patches spreading indefinitely.

Fructification. Minute seeds (*zoospores*) formed of the coloured cells in the filaments; which cells then separate from each other and drop out.

Habitat. Coast of Devonshire. On rocks at high-water mark; chiefly in places exposed to the drip of fresh water.

Fig. 355. SCHIZOTHRIX CRESWELLII.

Colour. The tuft greenish-olive; the threads which compose it, yellowish-green.

Substance. The tufts soft; spongy; the threads which compose it rigid.

Character of Frond. Dense, cushion-like tufts, spreading on the surface of rocks in round or oval patches; composed of very slender threads (*filaments*) collected into branching bundles. Filaments curved, interlaced, branched in a forked manner (a microscopic object).

Measurement. The patches several inches across.

Fructification. Not ascertained.

Habitat. On sandstone rocks near high-water mark; exposed to the drip of fresh water.

Fig. 356. CALOTHRIX CONFERVICOLA.

Colour. A fine, deep, metallic green; reflecting prismatic colours under water.

Substance. Rigid for so tiny a plant.

Character of Frond. Minute, starry tufts of threads (*filaments*) only a few in each; scattered over the fronds of other algæ, and often covering them altogether. Filaments tubular; containing very narrow, cylindrical colour-cells, which show through, with division-lines.

Measurement. Never more than $\frac{1}{4}$ inch high; often less.

Fructification. As in *Schizosiphon* and *Rivularia.*

Habitat. Our coasts generally. On small algæ between tide-marks. Abundant in the autumn.

This charming little parasite, instead of disfiguring the plant on which it grows, often makes it a good deal handsomer than it was before. For instance, it is specially fond of the pale, sickly-looking *Ceramium rubrum*, which grows in high-water pools, and this it adorns with a fringe of dark green. Some unusual appearances are figured in the outer magnified form on the Plate. They are not understood.

Plate LXXVI.

Fig. 357. CALOTHRIX PANNOSA.

Colour. Dark green.

Substance. Rigid; wiry.

Character of Frond. Long, blunt, very much curled and twisted threads (*filaments*) densely interwoven into compressed tufts, or a sort of honeycombed layer on rocks. Filaments tubular; containing narrow, cylindrical colour-cells, which show through, with division-lines.

Measurement. The filaments ½ an inch long; the larger spreading.

Fructification. Minute seeds (*zoospores*) formed of the colour-cells in the filaments; which cells then separate from each other and drop out.

Habitat. Roundstone Bay. Kilkee. Sidmouth. On rocks or algæ near high-water mark. Rarely observed.

For other *Calothrixes*, see Plate LXXVII.

Fig. 358. LYNGBYA MAJUSCULA.

Colour. Blackish-green.

Substance. Crisp; rigid; glutinous.

Character of Frond. Large tufts or bundles of long, very thick, curling, twisted threads (*filaments*) issuing from interwoven layers of the same. Filaments not branched, but lying together as if they were; tubular; containing very narrow, cylindrical, dull-green colour-cells, which show through; their division-lines obscure.

Measurement. Filaments 1 or 2 inches long; the layers indefinitely spreading.

Fructification. As in *Calothrix*, &c.

Habitat. Our coasts generally. On mud or sand-covered rocks at and below half-tide level; also thrown up after storms. Not uncommon.

By far the largest of British *Lyngbyas*, and like tufts of curling human hair, were it not for the *mermaidy* colour.

Fig. 359. LYNGBYA FLACCA.

Colour. Bright green.

Substance. Very soft; flabby.

Character of Frond. Short tufts of straight, or gently curved, jointed threads (*filaments*), parasitic on other algæ; simple, or bearing here and there a few root-like branchlets. Filaments very slender; finer than human hair.

Joints. Half as long as broad; at first more or less filled with colouring matter (*endochrome*) which afterwards contracts into a dark spot in the centre.

Measurement. From half an inch to an inch long.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, collected into a round central mass (*sporidium*), which in due time bursts out.

Habitat. Our coasts generally. (Filey.) On various algæ and in tide-pools. Not uncommon.

Now *Hormotrichum flaccum.* For other *Lyngbyas,* see Plate LXXVIII. For the characters of *Hormotrichum,* refer under Fig. 328.

Fig. 360. HORMOSPORA RAMOSA.

Colour. Pale green.

Substance. Gelatinous.

Character of Frond. Very slender, tubular threads (*filaments*); more or less branched; containing, when young, nearly cylindrical colour-cells; when mature, distinctly oval or spherical ones; the colouring matter (*endochrome*) within radiating in lines from a centre (a microscopic object.)

Measurement. From $\frac{1}{4}$ to $\frac{1}{2}$ an inch high.

Fructification. Minute seeds (*zoospores*) formed of the coloured cells, which then become oval, and finally drop out.

Habitat. Near Wareham, Dorsetshire, in a salt-water lake.

Plate LXXVII.

Fig. 361. CALOTHRIX LUTEOLA.

Colour. Light green; or (when the colour-cells have dropped out) pale horn-colour.

Substance. Very soft.

Character of Frond. Exceedingly slender threads (*filaments*) scattered along the stems of the lesser algæ, forming a downy fringe. Filaments unbranched; tubular; some containing very narrow, close-set, cylindrical colour-cells, which show through; their division-lines faintly marked; some partially or entirely empty from these having dropped out.

Measurement. One-tenth, or at most $\frac{1}{5}$ of an inch high!

Fructification. Minute seeds (*zoospores*) formed of the colour-cells in the filaments; which cells then separate from each other and drop out.

Habitat. Appin; but should be looked for elsewhere. On thread-shaped (*filiform*) algæ in tide-pools.

Fig. 362. CALOTHRIX FASCICULATA.

Colour. Very dark, shining green.

Substance. Velvety; very slippery to walk upon.

Character of Frond. Minute tufts of very straight, upright, finely-pointed threads (*filaments*); forming a spreading velvety layer upon rocks. Filaments not branched; but sometimes surrounded at top with a set of lesser ones lying close against them, branch-*like*; tubular; containing very narrow, close-set, cylindrical colour-cells, which show through; their division-lines strongly marked.

Measurement. Filaments $\frac{1}{5}$ or $\frac{1}{3}$ of an inch high; the velvety layer indefinite.

Fructification. As in the preceding.

Habitat. Miltown Malbay, and probably elsewhere. Spreading over the surface of rocks about half-tide level.

Possibly only *C. scopulorum*, grown in deeper water. It is taller, straighter, darker, and occasionally appears branched above, as described.

Fig. 363. CALOTHRIX SCOPULORUM.

Colour. A dull, dirty green.

Substance. Velvety; very slippery to walk upon.

Character of Frond. Exceedingly minute, upright, wavy threads (*filaments*); often finely tapering; rising from a slimy base; forming a spreading, velvety layer upon rocks. Filaments unbranched; tubular; containing very narrow, close-set, cylindrical colour-cells, which show through; their division-lines indistinctly marked.

Measurement. One-fifth of an inch high.

Fructification. As before.

Habitat. Our coasts generally. On rocks near high-water mark. Common.

Fig. 364. CALOTHRIX SEMIPLENA.

Colour. Verdigris green.

Substance. Rigid.

Character of Frond. Tufts of very slender, wavy threads (*filaments*); densely interwoven into compressed bundles. Filaments unbranched; tubular; containing narrow, cylindrical colour-cells; some of which are apt to run out, leaving empty transparent patches in the tubes; the rest showing through, with division-lines.

Measurement. One or 2 inches high.

Fructification. As before.

Habitat. Our coasts generally. In rock-pools near high-water mark, growing on *Corallina officinalis* and other small algæ.

Fig. 365. CALOTHRIX HYDNOIDES.

Colour. Dark olive-green (blackish under the microscope).

Substance. Rigid; plush-like, not velvety.

Character of Frond. Slender, wavy, obtuse threads (*filaments*); some interwoven into a thin, flat layer; others rising up in close, stiff, sharp-pointed tufts; forming thin patches. Filaments not branched, but lying against each other as if they were; especially above, where three or four crowd together, cohering by their ends, and bristling out in sharp points; tubular; containing narrow, cylindrical black-green colour-cells, which show through, with division-lines.

Measurement. Filaments an inch high. Patches, an inch or two across, on the clayey shore. Spreading for several feet on rocks.

Fructification. As before.

Habitat. Appin. On the clayey sea-shore near high-water mark.

Much more rigid and harsh-feeling than *C. scopulorum,* and very like pieces of *rough plush.* Known from *C. pannosa* by much shorter filaments, and the sharp tooth-like tops of the tuft-divisions.

Fig. 366. CALOTHRIX CÆSPITULA.

Colour. Blackish green.

Substance. Soft; velvety.

Character of Frond. Close, very round, cushion-like tufts of densely-packed threads (*filaments*). Filaments upright, wavy, blunt, often twisted into small bundles; not branched, but sometimes lying against each other as if they were; tubular; containing very narrow, cylindrical colour-cells, which show through; their division-lines very strongly marked.

Measurement.. Tufts from $\frac{1}{4}$ to $1\frac{1}{2}$ inch in diameter.

Fructification. As before.

Habitat. Spanish Point at Miltown Malbay, Co. Clare. In rock-pools near high-water mark. Only once found in Ireland.

Fig. 367. LYNGBYA FERRUGINEA.

Colour. A dull verdigris-green, changing to rust-colour, but resuming the green, when dry.

Substance. Soft; woolly when dry.

Character of Frond. Excessively slender threads (*filaments*) closely matted together; forming a layer at the bottom of mud-bottomed pools. Filaments bent in various curves, but not twisted; unbranched; tubular; containing narrow, cylindrical colour-cells, which show through; with tolerably clear division-lines.

Measurement. Filaments from $\frac{1}{4}$ to 1 inch high; the larger spreading for several inches.

Fructification. Minute seeds (*zoospores*) formed of the colour-cells in the filaments; which cells then separate from each other, and at last drop out.

Habitat. Appin, and elsewhere. Filey, on the rocks leading to the bridge. In small mud-bottomed pools near high-water mark. Not uncommon.

Fig. 368. LYNGBYA CARMICHÆLII.

Colour. A bright grass-green.

Substance. Soft.

Character of Frond. Very long, wavy, strongly curled, jointed threads (*filaments*); fixed at base, but forming extensive, closely-entangled, fleecy layers; floating freely under water.

Joints. Very short; scarcely half as long as broad; filled with dense green colouring matter (*endochrome*), which afterwards contracts into a dark spot in the centre.

Measurement. Almost indefinite. On *Fucus vesiculosus*, upwards of 1 foot. On rocks, covering a space of 20 or 30 yards.

Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, collected into a round central mass (*sporidium*), which in due time bursts out.

Habitat. South and west coasts of England. West of Scotland. Ireland generally. On rocks, algæ, floating timber, &c.; between tide-marks and beyond.

Now *Hormotrichum Carmichælii.* See under Fig. 328.

Fig. 369. LYNGBYA SPECIOSA.

Colour. Bright yellow-green; glossy when dry.

Substance. Soft; gelatinous.

Character of Frond. Long; thick; first straight, then curled, jointed threads (*filaments*); unbranched; fixed at base, but forming extensive, closely-entangled, fleecy layers; floating freely under water.

Joints. Very short; scarcely half as long as broad; filled with bright green colouring matter (*endochrome*), which afterwards contracts into a dark spot in the centre.

Measurement. Three or 4 inches long.

Fructification. As in *L. Carmichælii*, but in *L. speciosa* the margins are often uneven, from the gradual dropping out of the *zoospore*-masses (*sporidia*).

Habitat. Appin. Torquay. St. Michael's Mount, &c. On rocks and algæ between tide-marks.

Now *Hormotrichum speciosum.* See under Fig. 328. The filaments are twice as robust as those of *L. Carmichælii,* and it adheres much more closely to paper in drying.

Fig. 370. LYNGBYA CUTLERIÆ.

Colour. A brilliant light grass-green.
Substance. Very soft and delicate.
Character of Frond. Excessively slender, gently waved, jointed threads (*filaments*); unbranched; fixed at base, but forming fleecy layers; floating freely under water.
Joints. About as long as broad; filled with bright green colouring matter (*endochrome*), which afterwards contracts into a round spot in the centre.
Measurement. From ¼ to 1 inch long.
Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the joints, collected into a round central mass (*sporidium*), which in due time bursts out.
Habitat. In estuaries. Exmouth, Miss Cutler. But the plant should be looked for further.

Now *Hormotrichum Cutleriæ.*

Fig. 371. MICROCOLEUS ANGUIFORMIS.

Colour. A dull, dark green.
Substance. Soft; gelatinous.
Character of Frond. Dense layers of small, snake-like tubes, tapering at their ends, widening upwards; open at the tops; forming patches on mud. Tubes filled (when fully developed) with numbers of very minute, stiff, straight threads (*filaments*); whose tips issue from the open tops, and may be observed (under a microscope) to wave backwards and forwards (*oscillate*).
Measurement. The patches about an inch long.
Fructification. Minute seeds (*zoospores*) formed of the colour-cells in the filaments; which cells then separate, and in due time drop out.
Habitat. Coast of Wales. West of Scotland. Pools of brackish water near the shore.

Fig. 372. OSCILLATORIA LITTORALIS.

Colour. The mass verdigris-green; dried filaments deep green.
Substance. The mass slimy; filaments elastic; when dry, membranaceous; scarcely adhering to paper.
Character of Frond. A thin layer of slender, straight, or slightly-curved threads (*filaments*); generally twisted into bundles. Filaments apt to break into needle-like fragments; unbranched; tubular; containing very narrow cylindrical colour-cells, which show through; their division-lines conspicuous, at intervals of about one-third the width of the filament.
Measurement. Indefinite.
Fructification. Minute seeds (*zoospores*) formed of the colour-cells in the filaments; which cells at last separate from each other and drop out.
Habitat. Appin. In pools along the muddy sea-shore, flooded by spring tides.

The filaments of this genus may be observed (under the microscope) waving to and fro (*oscillating*) as if possessed of animal life. For this purpose a morsel should be placed in a glass with a few drops of water. The reason of this curious fact is not known.

Fig. 373. OSCILLATORIA SPIRALIS.

Colour. The layer greenish-black, or verdigris; glossy; dried filaments the same.
Substance. The layer sometimes leathery, sometimes membranaceous; scarcely gelatinous; filaments rigid.
Character of Frond. A more or less thin layer of short, slender, jointed threads (*filaments*), stiffly curled and twisted; turned in all directions; densely interwoven. Filaments apt to break into short fragments; unbranched; tubular; containing narrow, cylindrical colour-cells, which show through, with division-lines.
Measurement. The larger layers sometimes several feet in extent. Filaments about $\frac{1}{20}$ of an inch long!
Fructification. Minute seeds (*zoospores*) formed of the colour-cells in the filaments; which cells at last separate from each other and fall out.
Habitat. Our coasts generally. On rocks above and between tide-marks; often left dry.

The waving to-and-fro (*oscillating*) movement of *Oscillatoria* filaments has been mentioned under Fig. 372.

Fig. 374. SPIRULINA TENUISSIMA.

Colour. Rich metallic, or verdigris-green.
Substance. The layer very gelatinous; slimy.
Character of Frond. A thin film of excessively slender, wavy, densely-twisted threads (*filaments*), lying nearly parallel. Filaments unbranched; tubular; containing bright green colour-cells, which show through; their division-lines close, and more or less distinct.
Measurement. The layer $\frac{1}{2}$ of an inch or more across.
Fructification. As above, in *Oscillatoria.*
Habitat. On decaying algæ, sticks, &c. in brackish pools near Menai Bridge. Pool near Dolgelly. Aberdeen.

The filaments of *Spirulina*, like those of *Oscillatoria* and *Microcoleus*, have, when alive and under water, the to-and-fro movement called oscillation, and in *Spirulina* the movement is particularly vivid.

Fig. 375. OSCILLATORIA NIGRO-VIRIDIS.

Colour. The layer a very dark olive-green, almost black; dried filaments pale-green.
Substance. The layer soft; gelatinous; filaments rigid.
Character of Frond. A thick layer of very slender threads (*filaments*), with distinctly curved blunt tips; at first growing on mud, afterwards floating. Filaments apt to break into needle-like fragments; unbranched; tubular; containing pale green colour-cells, which show through; their division-lines inconspicuous; set at intervals of about half the width of the filament.
Measurement. Indefinite.
Fructification. As before.
Habitat. Shirehampton, Bristol. In a brackish ditch.

Fig. 376. OSCILLATORIA SUBULIFORMIS.

Colour. The layer looking blackish under water; when taken out a deep beautiful blue-green; filaments bright green.
Substance. The layer soft; gelatinous.
Character of Frond. A thinnish layer of very slender threads (*filaments*), awl-shaped, with pointed tips; at first growing on mud, afterwards floating. Filaments apt to break into needle-like fragments; unbranched; tubular; containing bright green colour-cells, which show through; their division-lines inconspicuous; set at intervals of from half to three-fourths the width of the filament.
Measurement. Indefinite.
Fructification. As before.
Habitat. Shirehampton, Bristol. In a brackish ditch. Found with the preceding, *O. nigro-viridis.*

The *oscillations* of *O. subuliformis* are very vivid.

Fig. 377. OSCILLATORIA INSIGNIS.

Colour. The layer dark brown, almost black; filaments brown.
Substance. Soft; gelatinous.
Character of Frond. A thin layer of large brittle threads (*filaments*), slightly curved, with blunt tips fringed with short, cobweb-like fibres. Filaments apt to break into needle-like fragments; unbranched; tubular; containing brown colour-cells, which show through; their division-lines conspicuous and very close.
Measurement. The layer indefinite; filaments larger than those of any other marine *Oscillatoria.*
Fructification. As before.
Habitat. Shirehampton, near Bristol. In a brackish ditch. Found with the two preceding.

The fringed tips occur in other *Oscillatorias,* but are more easily observed in this one, from the much greater thickness of the filaments.

Fig. 378. MONORMIA INTRICATA.

Colour. At first olive-yellow; gradually greenish; when dry, deep verdigris-green.
Substance. Very gelatinous and soft.
Character of Frond. A small, roundish, floating mass; formed of single threads (*filaments*), densely curled and twisted; immersed in loose, gelatinous, tube-like cylinders; several times branched. Filaments formed of globose cells, filled with colouring matter (*endochrome*); strung together; a larger cell, of different character, interrupting the uniformity here and there (a microscopic object).
Measurement. The little mass $\frac{1}{4}$ of an inch across.
Fructification. Minute seeds (*zoospores*) formed of the colouring matter in the *usual* cells of the filaments, and in due time bursting through them.
Habitat. Gravesend. In the ditches of the marsh to the south of the Frindsbury canal. Very abundant.

Sometimes found with, and even inside, *Enteromorpha intestinalis;* and in fresh water.

Plate LXXX.

Fig. 379. SPHÆROZYGA CARMICHÆLII.

Colour. The filmy patches vivid green.

Substance. Gelatinous; slimy.

Character of Frond. A thin film, consisting of minute, straight, brittle threads (*filaments*), tapering to each end; unbranched; lying in a layer of jelly.

Filaments. Formed of bead-like colour-cells; a larger, colourless one (called the connecting cell), fringed with hairs, intermixed here and there. At maturity, some of the colour-cells run together, forming larger ones (a microscopic object).

Measurement. Patches $\frac{1}{8}$, filaments $\frac{1}{40}$ of an inch long!

Fructification. Minute seeds (*zoospores*) formed in the enlarged colour-cells, which are then oblong, twice or thrice as long as broad, and brownish.

Habitat. Appin. Menai Bridge, &c. On decaying heaps of algæ. Also in brackish water.

Fig. 380. SPHÆROZYGA THWAITESII.

Colour. Patches deep green; almost black; filaments pale green.

Substance. Very gelatinous; slimy.

Character of Frond. Filmy patches, consisting of minute, curved, entangled threads (*filaments*); unbranched; lying together in a layer of jelly.

Filaments. Formed of bead-like colour-cells; a larger, lighter-coloured one (called the connecting cell), fringed with hairs, intermixed here and there (generally near the ends). At maturity, some of the colour-cells run together, forming larger ones (a microscopic object).

Measurement. Patches $\frac{1}{8}$, filaments $\frac{1}{40}$ of an inch long.

Fructification. Minute seeds (*zoospores*) formed in the enlarged colour-cells, which are then oval, once and a half as long as broad, and brown.

Habitat. Dolgelly. Shirehampton. On muddy sides of brackish water, or floating.

Fig. 381. SPERMOSIRA LITTOREA.

Colour. Deep green.

Substance. Membranaceous; scarcely gelatinous.

Character of Frond. A fleecy layer of robust, nearly straight threads (*filaments*); unbranched; tubular; filled with very narrow, closely-packed colour-cells; a rather wider, pale reddish one (called the connecting cell) intermixed here and there. At maturity, some of the colour-cells run together, forming larger ones (a microscopic object).

Measurement. Fleecy layers $\frac{1}{2}$ inch long; filaments as fine as human hair.

Fructification. Minute seeds (*zoospores*) formed in the enlarged colour-cells, which are then oval and brown.

Habitat. In muddy, brackish water.

Fig. 382. SPHÆROZYGA BROOMEI.

Colour. Deep green.

Substance. Gelatinous; slimy.

Character of Frond. Filmy patches, consisting of minute straight threads (*filaments*); unbranched; lying together in a layer of jelly.

Filaments. Formed of bead-like colour-cells, with here and there a larger, squarish, colourless one (called the connecting cell) intermixed. At maturity, some of the colour-cells run together, forming larger ones (a microscopic object).

Measurement. Patches $\frac{1}{8}$, filaments $\frac{1}{40}$ of an inch long.

Fructification. Minute seeds (*zoospores*) formed in the enlarged colour-cells, which are then oval, twice as long as wide, not much wider than the ordinary cells, and brown.

Habitat. In a brackish ditch at Shirehampton. On dead leaves.

Fig. 383. SPHÆROZYGA BERKELEYANA.

Colour. Vivid green.

Substance. Very gelatinous; slimy.

Character of Frond. Filmy patches, consisting of minute curved threads (*filaments*); unbranched; lying together in a layer of jelly; the younger ones often enclosed, several together, in a distinct gelatinous sheath. (See Figure).

Filaments. Formed of bead-like colour-cells, with here and there a larger, slightly-compressed, colourless one intermixed. At maturity, some of the colour-cells run together, forming larger ones (a microscopic object).

Measurement. Patches $\frac{1}{6}$, filaments perhaps $\frac{1}{30}$ of an inch long.

Fructification. Minute seeds (*zoospores*) formed of the enlarged colour-cells, which are then oblong, twice the width of the ordinary cells, and brown; and lie, generally in pairs, on each side a connecting cell.

Habitat. In a brackish ditch at Shirehampton. Amongst the filaments of *Conferva fracta*, &c.

Fig. 384. SPERMOSIRA HARVEYANA.

Colour. Brilliant green.

Substance. Membranaceous; scarcely gelatinous.

Character of Frond. A fleecy layer of slender, much curled and twisted threads (*filaments*); unbranched; tubular; containing green colour-cells nearly as long as broad; a longer, squarish, pale reddish one (called a connecting cell) intermixed here and there. At maturity, some of the colour-cells run together, forming larger ones (a microscopic object).

Measurement. Fleecy layers $\frac{1}{2}$ inch long; filaments rather finer than human hair.

Fructification. Minute seeds (*zoospores*) formed in the enlarged colour-cells, which are then exactly globose, almost twice the width of the common cells, and a fine chesnut brown.

Habitat. Muddy, brackish ditches at Shirehampton. Found with *Sphærozyga Broomei.*

APPENDIX OF NEW SPECIES

DISCOVERED SINCE THE PUBLICATION OF THE "PHYCOLOGIA BRITANNICA."

OLIVE GROUP.

Family I. FUCACEÆ.

FUCODIUM ANCEPS.

Colour. When fresh, olive green.

Substance. Tough and leathery.

Character of Frond. Compressed, slender, branched. Branchlets forked (*dichotomous*).

Measurement. Four or 5 inches long.

Air-vessels. None observed.

Fructification. Minute seeds (*spores*) in special receptacles, forming long, narrow pod-like forks at the tips of the branchlets.

Habitat. Only found as yet on a rock at Kilkee, Co. Clare.

This was Dr. Harvey's last discovery in 1863, of which the reader must for the present accept an unscientific description. The long, narrow, pod-like receptacles standing upright in pairs at the ends of the branchlets, distinguish this *Fucodium* from all the others.

Family II. SPOROCHNACEÆ.

DESMARESTIA DRESNAII.

Colour. Pale brown, becoming a pleasant olive-green when dry.

Substance. Firmly membranaceous; somewhat horny when fresh; never becoming very soft.

Character of Frond. Flat, leaf-like, with an evident but thin midrib throughout, and side veins; margins slightly indented. When perfect, oppositely *branched* (if the phrase be allowed) with leaf-like fronds of the same character: the whole plant consisting of leafy formations, springing from each other.

Measurement. Specimen in Trinity College Herbarium (Dublin), 10 inches long by 2 wide. But Mr. Sawers describes others as 18 inches long, breadth 3.

Fructification. Not ascertained.

Habitat. Moville Bay, Co. Donegal, 1853. Mr. W. Sawers.

By Agardh, and also by Dr. Harvey, this plant is considered as only an extravagantly wide form of *D. ligulata;* but no one who has not seen intermediate specimens can easily believe this. Yet, in the tapering to both ends of the so-called *branches* of the common forms of *D. ligulata*, a tendency to leaf-like formation may be observed; the branchlets especially, resembling small ribless leaves. On the other hand, the "obscure midrib towards the base" of *D. ligulata* indicates an inclination to that formation also. Any one interested in the subject will find the growth of *Desmarestia* described in Dr. Harvey's *Nereis Boreali-Americana*, vol. i. p. 77.

FAMILY V. CHORDARIACEÆ.

LEATHESIA CRISPA.

Colour. Olive-brown.

Substance. Always firm and solid.

Character of Frond. More or less globose; forming small tubers upon the fronds of other algæ. The internal threads which compose it, densely crowded. Tubers running together in irregular patches as their growth proceeds.

Measurement. Tubers from $\frac{1}{10}$ to $\frac{1}{3}$ of an inch in diameter; patches an inch or more.

Fructification. Minute seeds (*spores*) concealed in the substance of the frond.

Habitat. Cumbrae in the Clyde. Growing on *Chondreas crispus.* April, May, and June, 1853. Mr. Roger Hennedy.

General observers may always know this plant from *Leathesia tuberiformis* (fig. 54) by its decidedly solid substance. A touch ascertains this at once. And its *tuber*-like character sufficiently distinguishes it from *L. Berkeleyi* (fig. 59). The more advanced student, who is disposed to make *durch-schnitts* of the two tuberous forms, will observe that the threads which compose the *outer-coat (periphery)* of *L. tuberiformis* are short and straight; whereas those of *L. crispa* are very distinctly curled, and are rather longer: nor are they as regularly and roundly bead-like in the latter as in the former. Very little difference is observable in the *spores* (which are borne among these outer-coat filaments at the base). For scientific description and figure see *Natural History Review,* 1857, "Proceedings of Societies," p. 201.

ELACHISTA GREVILLEI.

Colour. Olive, tending to brown.

Substance. Somewhat rigid.

Character of Frond. A small tuft (rising from a small tubercle); parasitic on *Cladophora rupestris.* Threads (*filaments*) slender; simple; tapering to the base; scarcely to the tips; jointed.

Measurement. From $\frac{1}{2}$ inch to $\frac{3}{4}$ long.

Fructification. Not ascertained.

Habitat. Largs: Dr. Greville, July, 1852. Corrighills, Arran: Professor Walker Arnott, the same year.

This little plant is described as "similar in many respects to *Elachista fucicola* (fig. 61), but smaller, with shorter joints and arising from a much smaller tubercle. Remarkable too for growing on one of the chlorosperm algæ, whose fronds it often infests as densely as *C. fucicola* does those of the *Fuci.*" For scientific description and figure see *Natural History Review,* 1857, "Proceedings of Societies," p. 201.

ELACHISTA HAYDENI.

Colour. Olive, tending to dark brown.

Substance. Soft.

Character of Frond. Minute tufts rising from a tubercle; parasitic on *Asperococcus echinatus*. Threads (*filaments*) very slender; curved; simple; not tapering to either end; jointed.

Measurement. About $\frac{1}{2}$ an inch long.

Fructification. Minute seeds (*spores*) concealed in the substance of the tubercle.

Habitat. Filey Bridge. Parasitic on *Chorda Lomentaria* and *Punctaria plantaginea*. The Rev. F. W. Hayden, 1862.

Those sufficiently interested in the *Elachistas* to examine them microscopically will be glad to be told further that the *tubercle*, whence their tufts arise, is in all cases composed of branching threads, so closely packed together as to form a compact mass. And among these branching threads nestle the *spores*, which in *E. Haydeni* are at the lower end of the threads, narrow oval in shape (narrow *ob-ovate, i. e.* the reversed egg-shape—the small end upwards), and have an abrupt cut-off appearance at top.

ELACHISTA? CAMBRIENSIS?

Colour. Dark olive.

Substance. Soft.

Character of Frond. Minute tufts (rising from a globose tubercle); parasitic on the stems of *Arthrocladia villosa*. Threads (*filaments*) within the tubercle, simple; tapering to the base; swollen to the circumference; then very long, tapering gradually from the circumference of the tubercle, to their extremity. Joints (*articulations*) of the threads (*filaments*) broader than long at the circumference; lengthening as they become narrower.

Measurement. Varying from $\frac{1}{12}$ to $\frac{1}{8}$ of an inch.

Fructification. Minute seeds (*spores*) growing on some of the threads of the tubercle.

Habitat. Only one known yet. Llanbedrog and Pwllheli, North Wales.

This plant is remarkably beautiful under the microscope when fresh, in consequence of its stellate appearance; when re-moistened the long threads become somewhat flabby and confused. I give it its name provisionally, until a scientific one has been awarded to it. Dr. Gray thought it had the characters of Professor Agardh's *E. stellaris*, but Agardh himself finds points of difference, and the matter will probably never be settled till some one else finds the plant, and probably on other *Fuci*. I found it in September, 1868, on *Arthrocladia villosa*, which was thrown up in quantities with *Ectocarpus littoralis* on the shore at Llanbedrog. Margaret Gatty.

FAMILY VI. ECTOCARPACEÆ.

ECTOCARPUS TESSELATUS.

This plant having been alluded to under fig. 95 as raised to the dignity of a species, it is necessary to add here that Dr. Harvey does not allow its claims to any other position than that of a varied form of *E. granulosus* (fig. 95); a species very irregular in its habit of growth. Sometimes it is *alternately* branched throughout, as appears to have been the case in the plant from which the figure in *English Botany* was taken, or it is alternately branched in the larger divisions, and exactly oppositely in the lesser ones, as figured in the *Phycologia Britannica;* or the last branchlets are *secund, i. e.* set along one side of the *penultimate* ones, like the teeth of a comb. And this is the case with the pretty form *E. tesselatus*, first discovered by the Rev. F. W. Hayden, in rock crevices on the rugged surface of Filey Bridge, at the further extremity. And as this *secund* branchleting occurs on both alternately- and oppositely-*branched* specimens, it would seem that these varieties of habit are of little importance.

The oppositely-branched is commonest on the south coast, and the alternate, or alternato-opposite, in the north. But they are found *conversely*. Dr. Cocks furnished fine *alternato-secund* to his *Algarum Fasciculi* from Plymouth; and *opposito-secund*, with occasional double pairs, was gathered off a buoy at Whitby this year (1862). Filey Bridge affords the three varieties.

The peculiarities of *E. tesselatus* appear to be the *secund* branchlets; a beautiful *green*-olive colour, and a richness and closeness of branching quite unknown in the larger forms, which often become straggling and have long portions of their stems naked. In a collection it will be well to call this plant *Ectocarpus granulosus, var. secundatus*—a name bestowed upon one of the *secund* forms by Lyngbye; and as Agardh unites under *E. granulosus* the oppositely-branched *lætus*, the collector may, if he pleases, subdivide the three forms by separate titles. The epithet *tesselatus* is equally applicable to all, for it was suggested by the *tesselated* appearance of the fruit; but this can only be observed under a very good microscope. The Whitby specimens, before alluded to, were furnished, besides the usual fruit, with globular bodies, having the appearance of *spores* inclosed in a hyaline cell. These were seated for the most part on the stems, the tesselated fruit on the branchlets. It is admitted by all, that the fructification of the *Ectocarpi* is very imperfectly understood; the *tesselated* formations not having the usual characters of *spores.*

RED GROUP.

Family VII. RHODOMELACEÆ.

RYTIPHLÆA OXYACANTHA.

A most delicate and lovely form discovered by Miss Turner in Jersey, in 1855, and provisionally called *R. oxyacantha* by Dr. Harvey. He is unwilling, however, to subdivide species unnecessarily, and has satisfied himself that this attractive little plant is but a slender and graceful variety of *Rytiphlæa thuyoides* (fig. 101.) Its general appearance is much less stiff and formal than that of the usual *R. thuyoides*, for the branchlets, instead of being short, and re-branchleted with another set shorter still, are longer and simpler, being rarely re-branchleted at all. It seems hard not to allow so interesting a variety a special name, but almost as much difference may be observed in the stiffer or slenderer forms of *Polysiphonia parasitica* as between *R. oxyacantha* and the coarser *R. thuyoides.*

POLYSIPHONIA FŒTIDISSIMA.

Specimens under this name having been distributed in Dr. Cocks' *Algarum Fasciculi*, it is necesssry to mention that Dr. Harvey does not consider it specifically distinct from *P. fibrata* (fig. 113). It is rather purpler in hue; but whether this arises from anything more than its growing on mud in a harbour, where the water cannot be so pure as on a more open sea, seems doubtful. Its professed *habitats* are the landing-places on the shore of Mount Edgcumbe, and Torpoint.

DASYA PUNICEA.

Colour. Bright rosy crimson; fading to yellow and whitish.

Substance. Soft, and somewhat gelatinous; soon decomposing in fresh water.

Character of Frond. Thread-like (*filamentous*); irregularly, much branched; bushy; the principal branches widely spreading and bearing many short branchlets on each side. Stems unjointed; the older ones worn naked and smooth; the younger, throughout the plant, closely set with rings (*whorls*) of very slender, delicate, soft, jointed branchle*teens*. These branchle*teens*, $\frac{1}{5}$ of an inch long; many times forked; tapering to a point; their joints from 4 to 6 times as long as broad.

Measurement. From 2 to 3 inches long, and as much in the spread of the branches.

Fructification. Of two kinds; external. 1. Clustered *spores*, in broadly ovate *capsules* with a short protruding mouth (*urceolate*); seated (*sessile*) on the branchlets. 2. *Tetraspores* in lanceolate, pointed, pod-like receptacles (*stichidia*); on the branchle*teens*.

Habitat. Bognor, October, 1858, Mrs. Gray. Brighton, July and August, 1859, Mrs. Merrifield.

This interesting addition to the list of British Seaweeds resembles Agardh's Trieste species, *D. punicea*, so closely, that Dr. Harvey believes it may be the same, although differing in one particular character; viz. the length of the joints of the branchle*teens*. Those of Agardh's plant being short; of the present form, long.

DASYA CATTLOVIÆ?

A form not yet described, from the fact that only one specimen, and that a barren one, has as yet been found. This unique treasure was discovered floating at very low water in St. Aubin's Bay, not far from Elizabeth Castle, Jersey, in August, 1858, by Miss Mary Cattlow. Externally, it bears some likeness to an Australian species, *D. Gunniana;* but its characters come nearest to those of the Mediterranean species, *D. punicea*, above described as having been lately found on the British shores. Dr. Harvey considers *D. Cattloviæ* more robust, however, and its brancle*teens* more generally distributed, and is inclined to think it may prove a distinct species.

It is mentioned here in the hope that such an announcement may induce other collectors to make diligent search for more specimens.

FAMILY IX. WRANGELIACEÆ.

NACCARIA HYPNOIDES.

Colour. Delicate rosy-red.

Substance. Very soft and gelatinous; adhering closely to paper in drying.

Character of Frond. Slender; thread-shaped (*filiform*); profusely branched; solitary or tufted. Stems wide in proportion to the branchlets; once or twice forked; set with long, wavy, horizontally-spread, opposite or alternate branches, tapering gradually upwards, and several times rebranched. Branches clothed with very slender-jointed branchlets; these furnished at every joint with rings (*whorls*) of minute, bead-like branchleteens, once or twice forked, and forming a little frill round each joint. Structure of the stem, an internal jointed tube, covered by a streaked, fibrous membrane, which, when fully developed, conceals it. The younger branches, or branchlets, therefore, where this coating is imperfectly grown, appear jointed, the older stems not. A branchlet, with its bead-like branchleteens fringing the partition lines (*dissepiments*) of every joint, is an exquisite microscopic object.

Measurement. Two or four inches long, and as much in the spread of the branches.

Fructification. Only one kind known. Tufts of naked *spores* formed in the middle part of the branchlets, swelling them out; attached to the *whorled* branchleteens.

Habitat. S. Catherine's Bay, Jersey: Miss Turner and Mr. Girdlestone. Exmouth: Mrs. Gulson.

It will be seen by a reference back to *N. Wiggii* how materially these species differ in internal structure, which we call attention to because, without reference to it, specimens of the two are often confounded.

FAMILY XIV. SQUAMARIEÆ.

CRUORIA PELLITA.

Colour. Dingy red.

Substance. Tough, but rather fleshy feeling.

Character of Frond. A scab-like incrustation spreading on the surface of rocks; composed of minute densely-packed, upright, jointed threads (*filaments*), set in gelatine. Filaments robust at the base; tapering upwards; in tufted bundles below; such of them as *elongate*, spreading upwards in a repeatedly forked manner.

Measurement. The patches indefinite.

Fructification. Only one kind known. *Tetraspores* oblong, divided by zones; clavate; forming a branch of one of the filaments.

Habitat. Sound of Jura: Rev. C. P. Miles. Cumbrae: on mussel shells (dredged), and on *Laminaria* stems; Mr. Hennedy. Miltown Malbay: Dr. Harvey. Probably in many other places. On rocks between tide-marks.

The *Cruoria pellita* of fig. 227 has been transferred to another genus, and is now *Petrocelis cruenta.* This change is owing to the position and character of the fruit. In *Petrocelis* (which, like *Cruoria,* is an incrustation composed of jointed threads) the tetraspores are formed in the (then) swollen centre cell of the threads themselves. In true *Cruoria* they are borne, as above described, on the threads of which the frond is composed: in fact, by the transformation of a branch into fruit. Scientific accounts of the *Cruorias,* accompanied by plates, were published in the *Natural History Review,* 1857, "Proceedings of Societies," p. 201.

CRUORIA ADHÆRENS.

Colour. Purplish or discolouring olive.

Substance. Tough, but rather fleshy-feeling.

Character of Frond. A scab-like incrustation spreading on rocks and laminaria stems; composed of minute densely-packed, upright, jointed threads (*filaments*), set in gelatine. Filaments tapering to both ends; many of them quite simple; a few once or twice forked upwards.

Measurement. The patches indefinite.

Fructification. Not clearly ascertained. Professor Agardh indeed says it bears *tetraspores*, but these have not been found in Great Britain. Dr. Walker Arnott assures us after patient study of the two species, that he has never seen a single specimen of *C. adhærens* in tetrasporic fruit. This species, however, bears very commonly certain green spore-like bodies or *sacs*, which look at first sight like fructification, but on examination cannot be ascertained to be such. It is remarkable that these *sacs* are not found on *C. pellita*, on which the tetrasporic fruit is not uncommon, and Dr. Arnott inclines to the belief that *C. adhærens* is merely a barren form of *C. pellita.*

Habitat. Kilcreggan. Opposite Gourock: Professor Walker Arnott. Aberdeen: Dr. Dickie. Penzance: Mr. Ralfs. Kilkee, 1844, Cushendall, Co. Antrim, 1850; Dr. Harvey. And probably in many other places. On rocks between tide-marks.

These odd incrustations form red stains on rocks and stones, as if blood had been spilt there, and can only be removed by a knife; and, of course, can only be understood by examination under the microscope.

ACTINOCOCCUS HENNEDYI.

Colour. Deep red.

Substance. Toughish, but rather gelatinous.

Character of Frond. An incrustation found on the *Laminaria* stems; composed of minute, closely-packed, upright-jointed bead-like threads (*filaments*), set in gelatine. Filaments tapering upwards; bead-like; sometimes simple, but frequently once or twice branched.

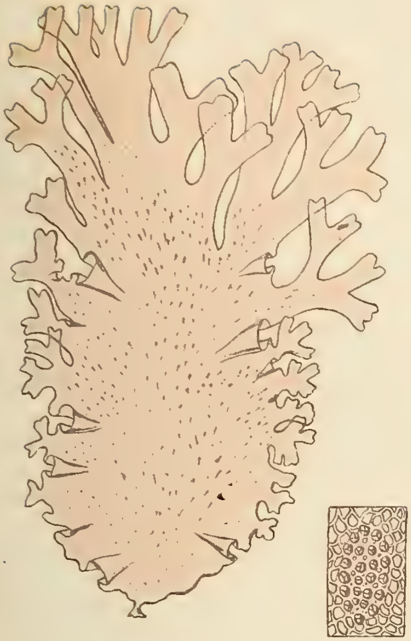
Measurement. Indefinite in outline.

Fructification. Only one kind known. Large *tetraspores*, formed by degrees in nearly all the joints of the threads, transforming them into "necklace-like strings of deep red beads." Each tetraspore divided cross-wise (*cruciate*).

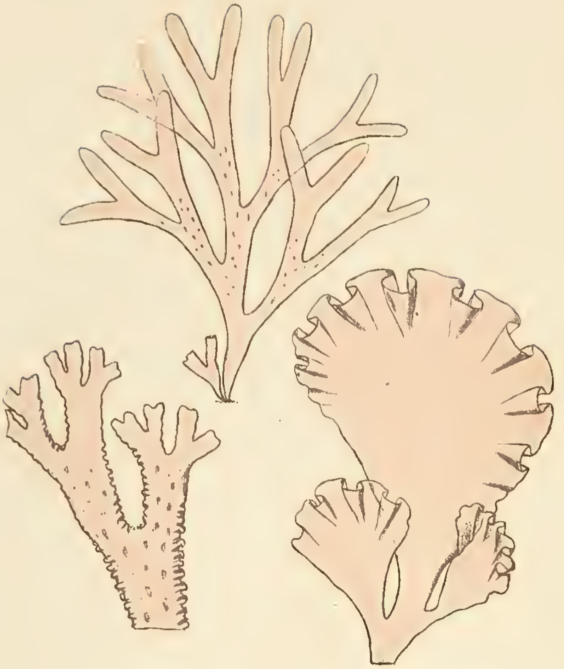
Habitat. On an old root of *Laminaria digitata* at Cumbræ: Mr. Roger Hennedy, 1852.

A beautiful microscopic object. For a scientific account and figure of this plant and others, see *Natural History Review* for 1857, "Proceedings of Societies," p. 201.

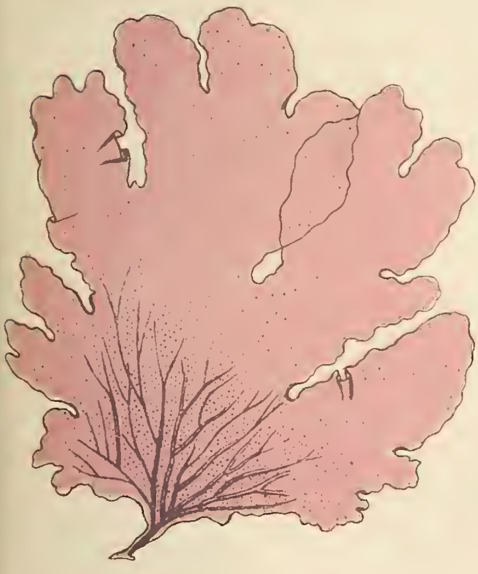
B. FAWCETT, PRINTER, DRIFFIELD.



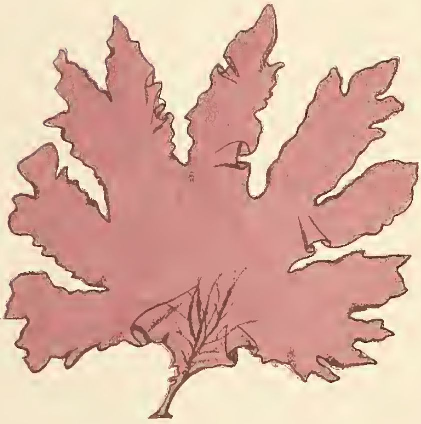
173.—Nitophyllum punctatum, *Grev.*



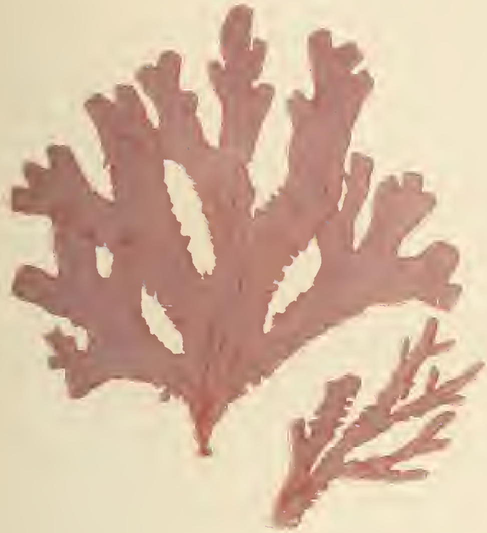
174.—Nitophyllum punctatum, *var.*



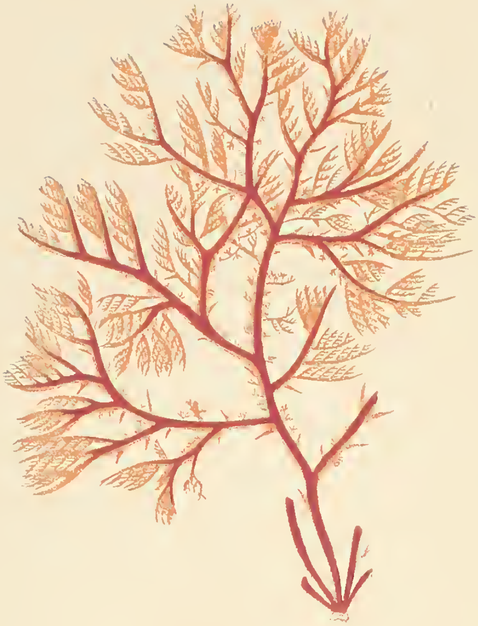
175.—Nitophyllum Hilliæ, *Grev.*



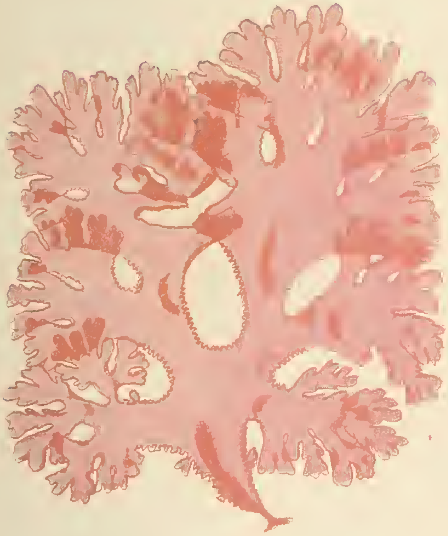
176.—Nitophyllum Gmelini, *Grev.*



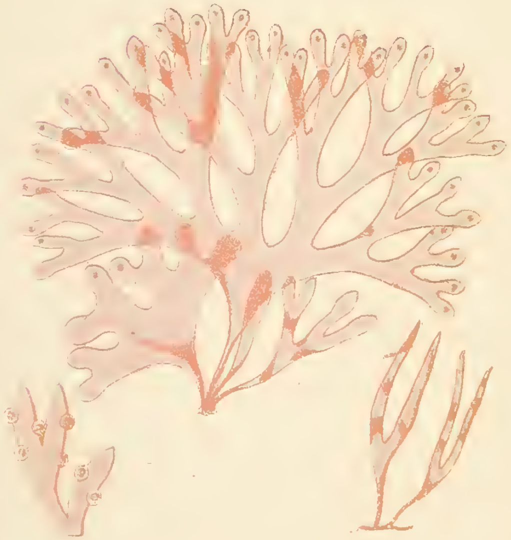
177.—Nitophyllum laceratum, *Grev.*



178.—Plocamium coccinium, *Lyngb.*

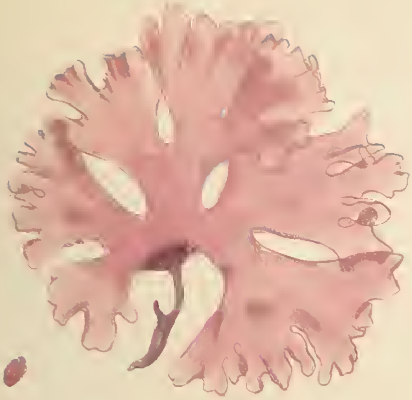


179.—Rhodymenia laciniata, *Grev.*

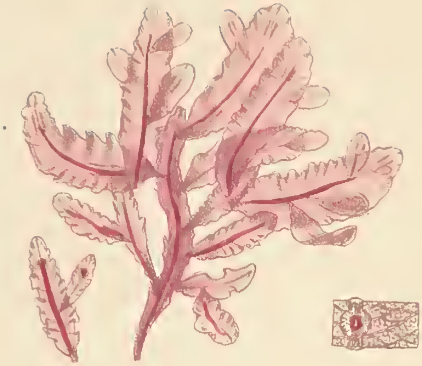


180.—Rhodymenia Palmetta, *Grev.*

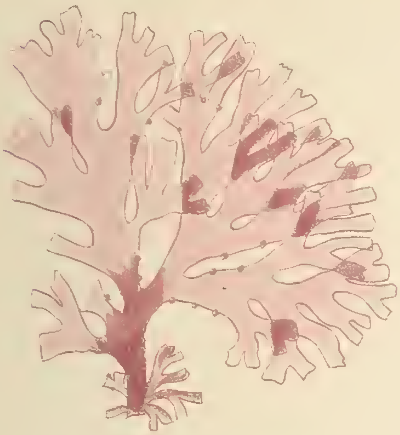
Plate XL.



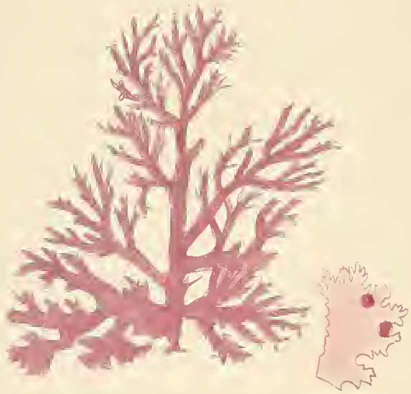
181.—Nitophyllum versicolor, *Harv.*



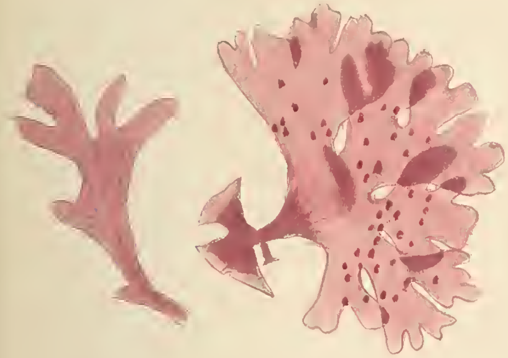
182.—Delesseria ruscifolia, *Lamour.*



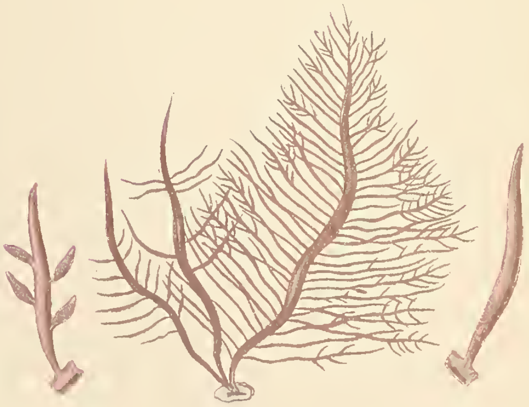
183.—Rhodymenia bifida, *Grev.*



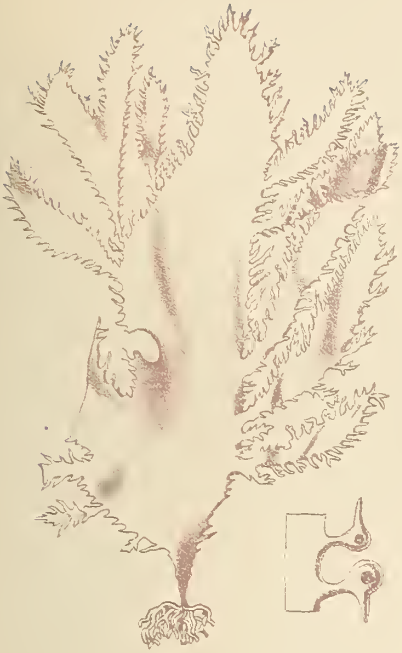
184.—Rhodymenia cristata, *Grev.*



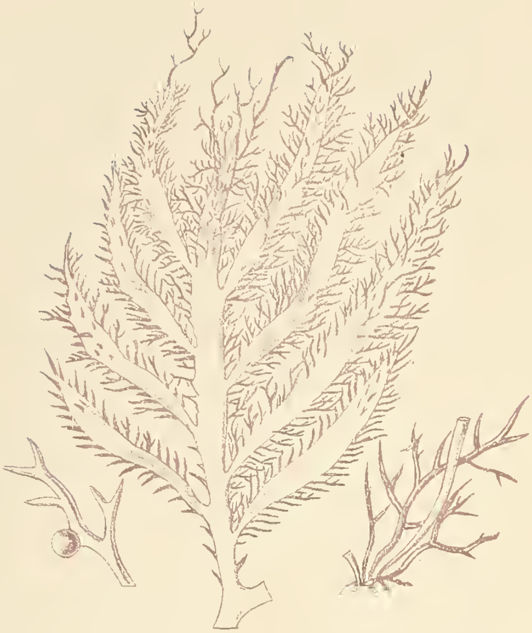
185.—Nitophyllum Bonnemaisoni, *Grev.*



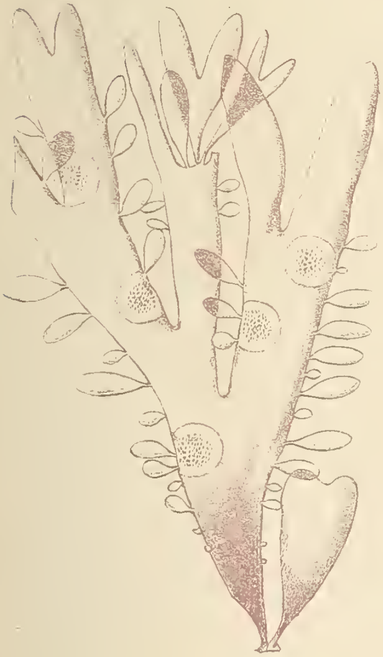
186.—Grateloupia filicina, *Ag.*



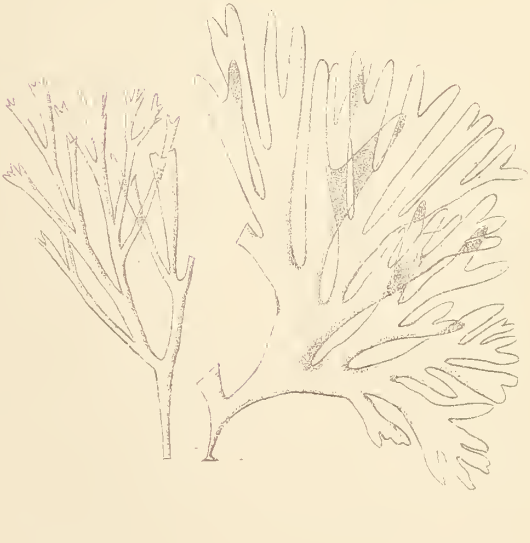
187.—Rhodymenia ciliata, *Grev.*



188.—Rhodymenia jubata, *Grev.*

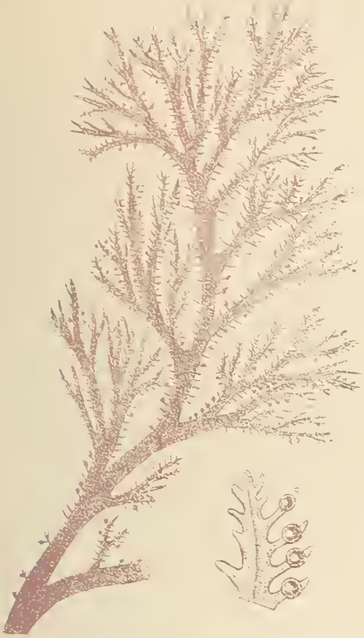


189.—Rhodymenia palmata, *Grev.*

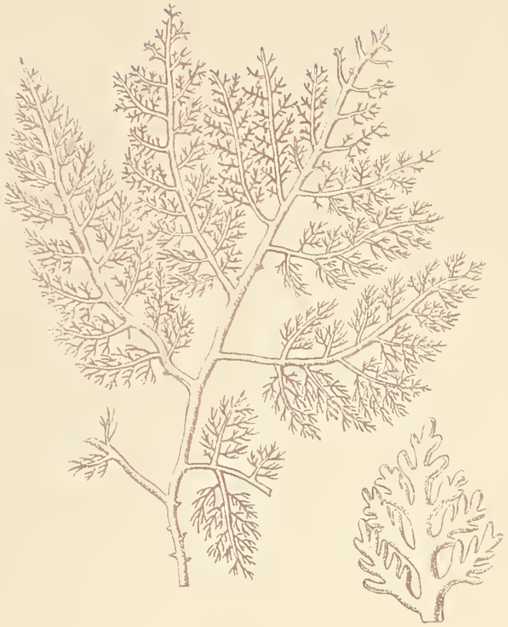


190.—Rhodymenia palmata, *var.*

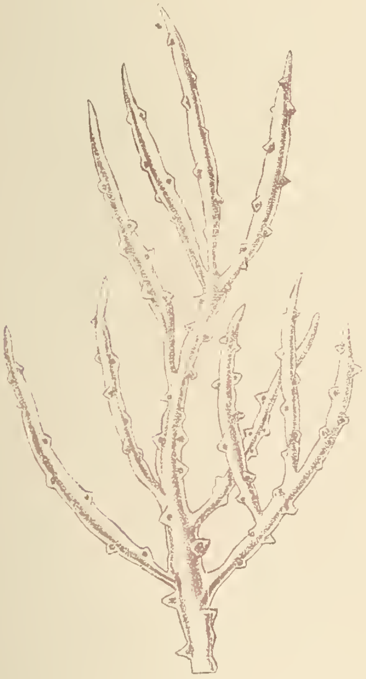
Plate XLII.



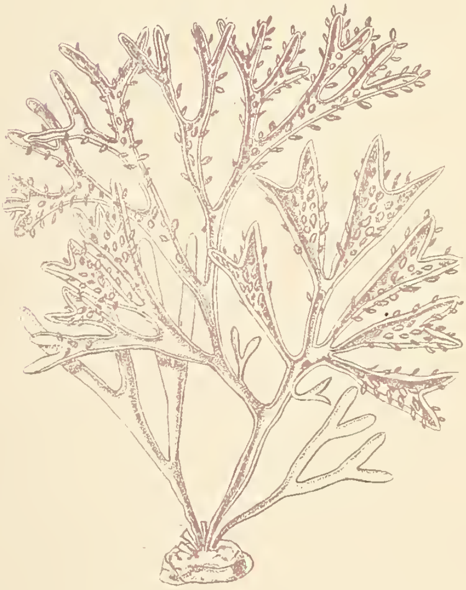
191.—Sphærococcus coronopifolius, *Ag.*



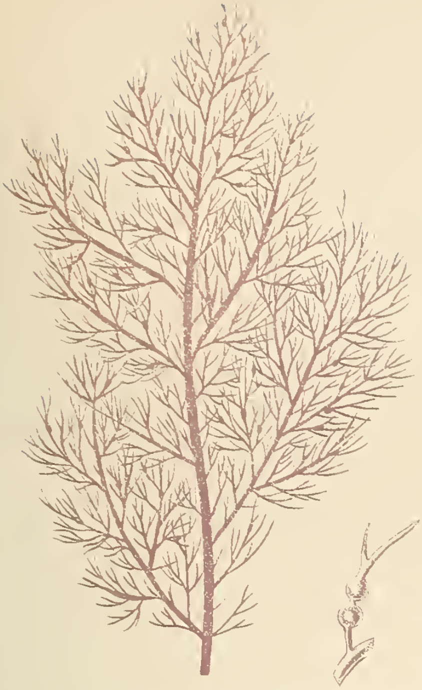
192.—Gelidium cartilagineum, *Gaill.*



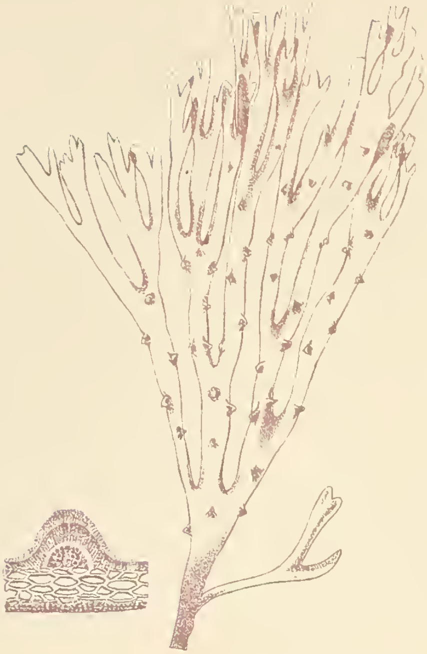
193.—Gracilaria compressa, *Grev.*



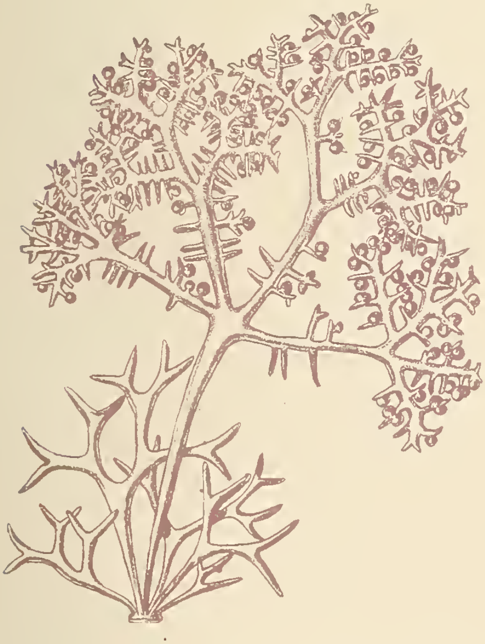
194.—Gigartina mamillosa, *J. Ag.*



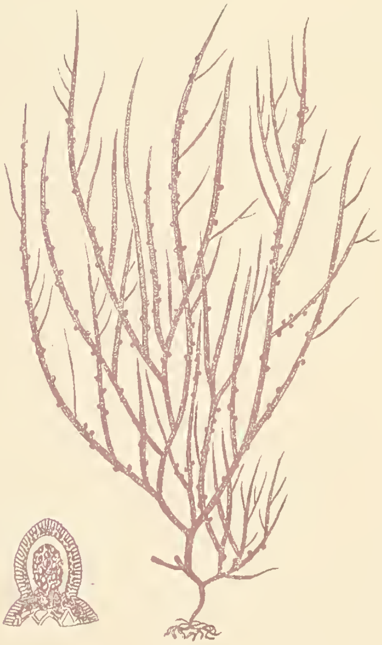
195.—Cystoclonium purpurascens, *Harv.*



196.—Gracilaria multipartita, *J. Ag.*

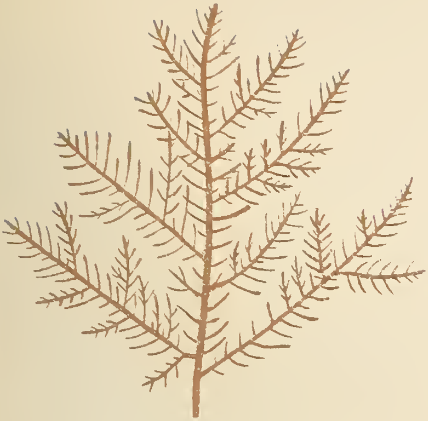


197.—Gigartina pistillata, *Lamour.*

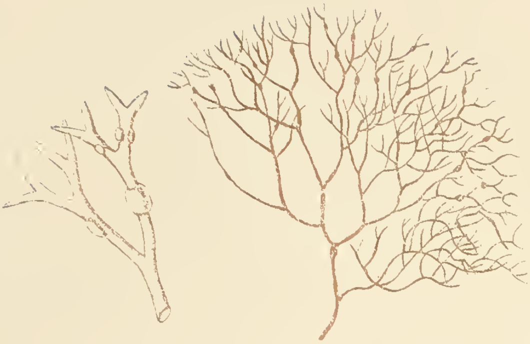


198.—Gracilaria confervoides, *Grev.*

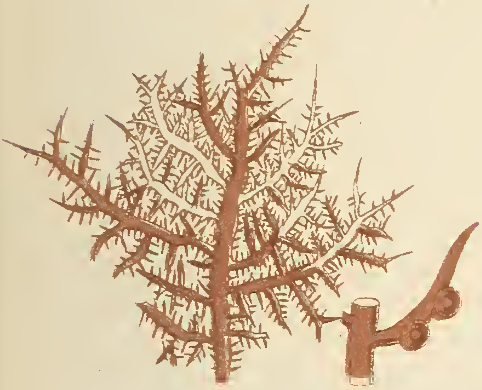
Plate XLIV.



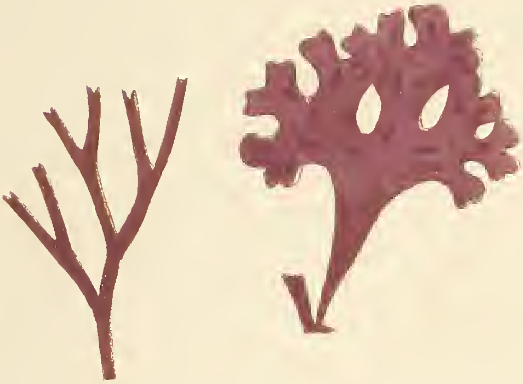
199.—Gelidium corneum, *Lamour.*



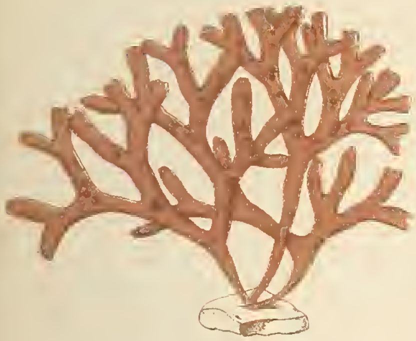
200.—Gymnogongrus Griffithsiæ, *Mart.*



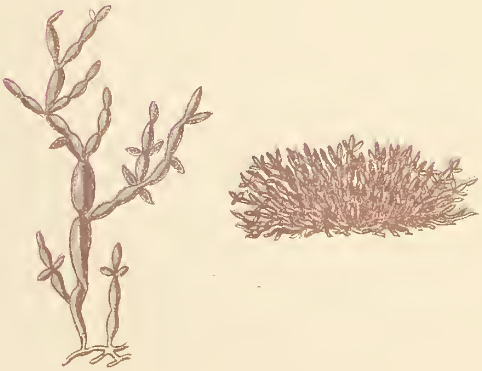
201.—Gigartina Teedii, *Lamour.*



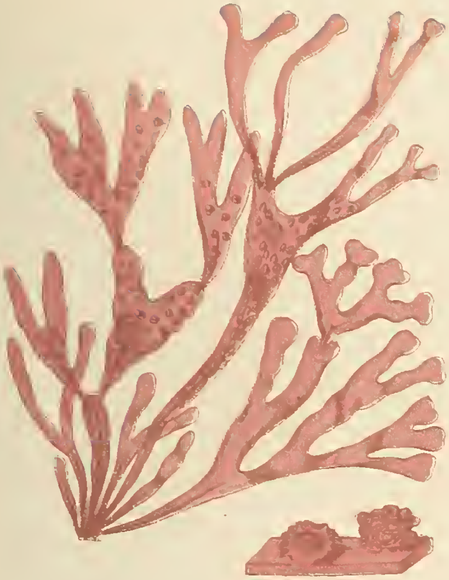
202.—Chondrus crispus, *Lyngb.*



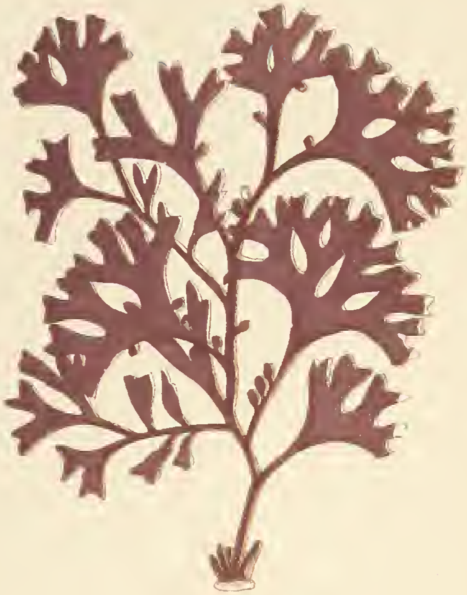
203.—Chondrus Norvegicus, *Lamour.*



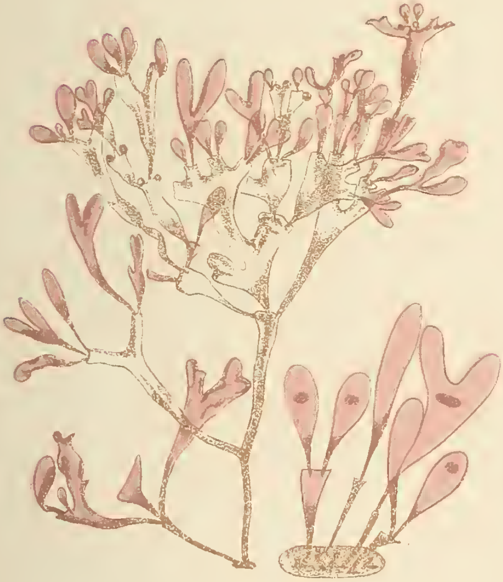
204.—Catenella Opuntia, *Grev.*



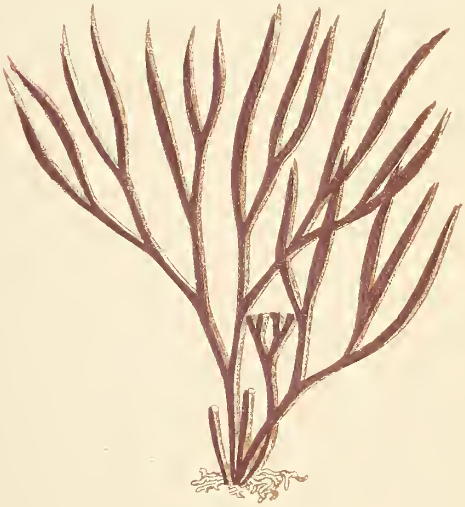
205.—Phyllophora rubens, *Grev.*



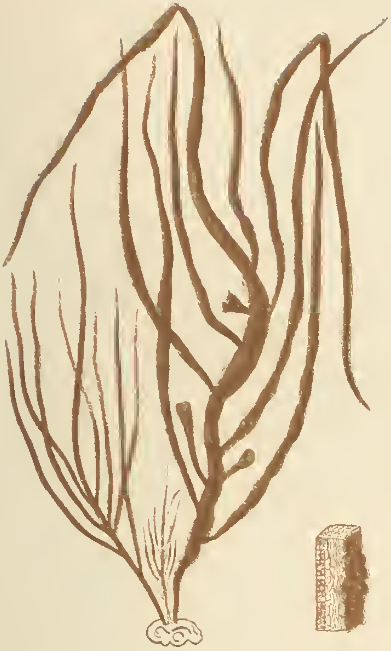
206.—Phyllophora membranifolia, *J. Ag.*



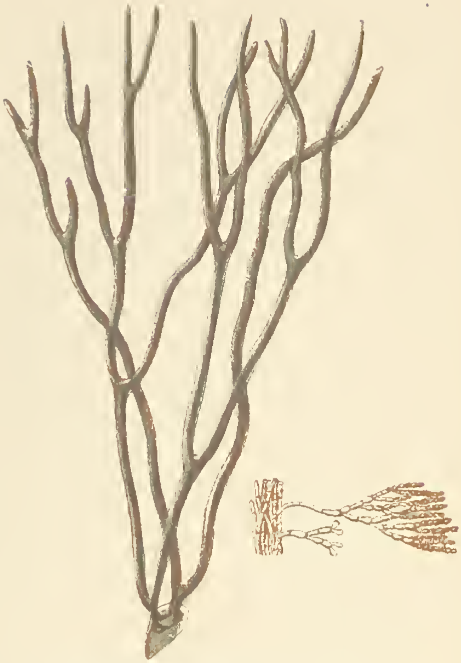
207.—Phyllophora Brodiæi, *J. Ag.*



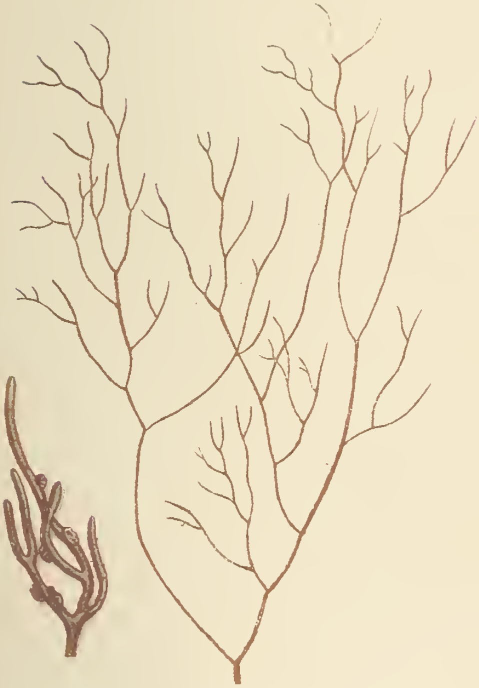
208.—Furcellaria fastigiata, *Lamour.*



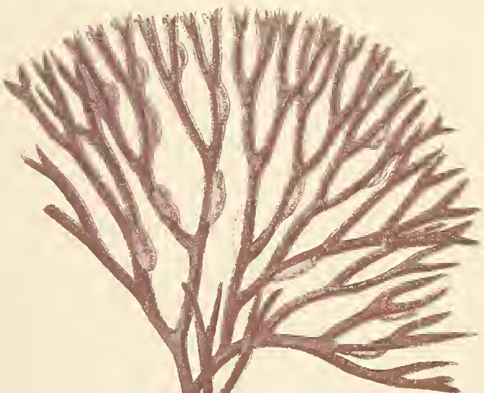
209.—Dumontia filiformis, *Grev.*



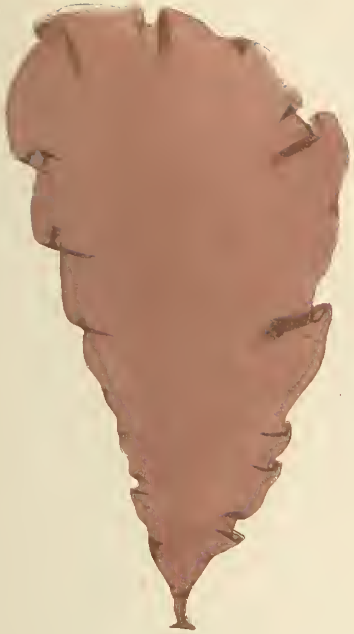
210.—Nemaleon multifidum, *J. Ag.*



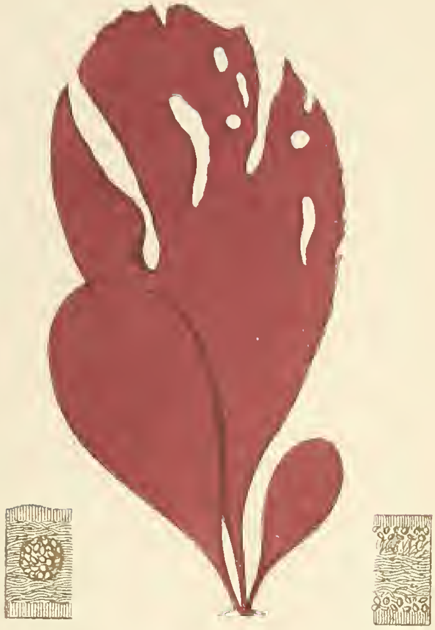
211.—Gymnogongrus plicatus, *Kütz.*



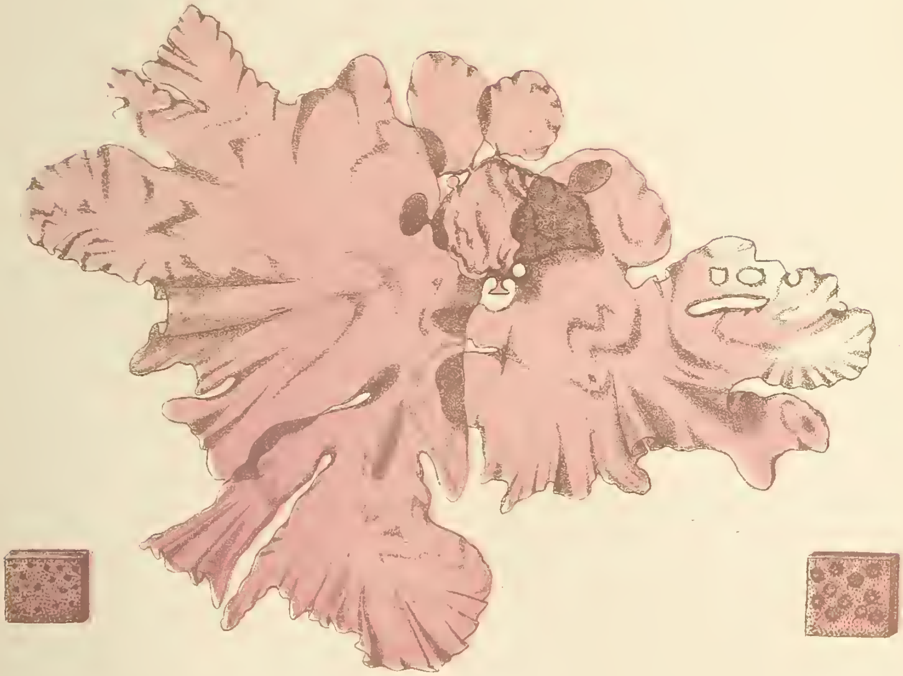
212.—Polyides rotundus, *Grev.*



213.—Kallymenia Dubyi, *Harv.*

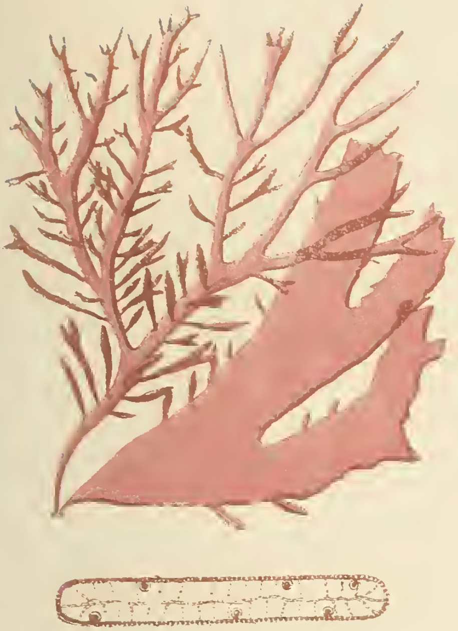


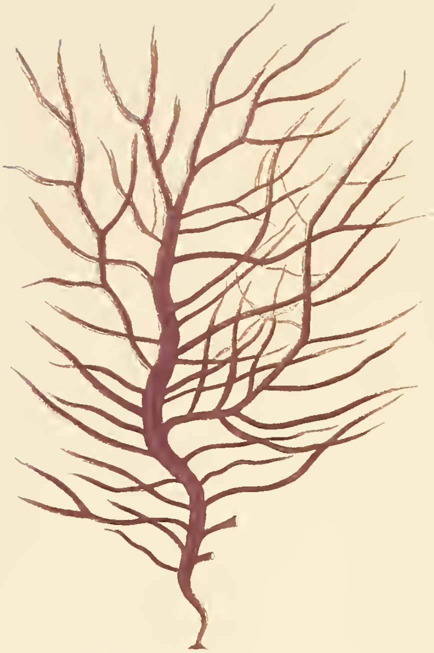
214.—Iridæa edulis, *Bory.*

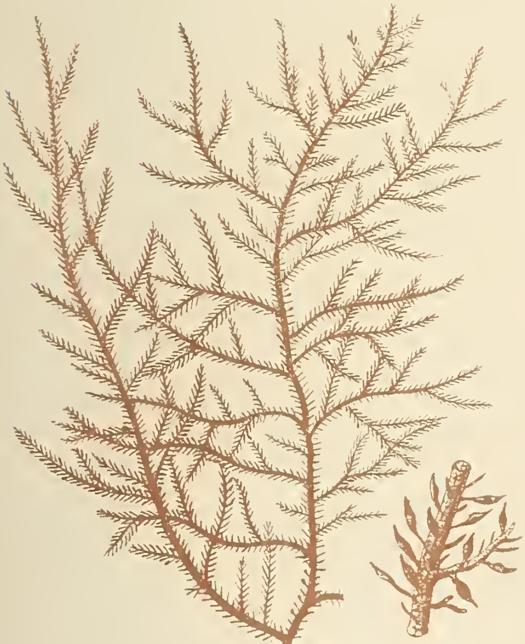


215.—Kallymenia reniformis, *J. Ag.*

Plate XLVIII.


216.—Halymenia ligulata, *Ag.*


217.—Nemaleon purpureum, *Chauv.*


218.—Naccaria Wiggii, *Endl.*

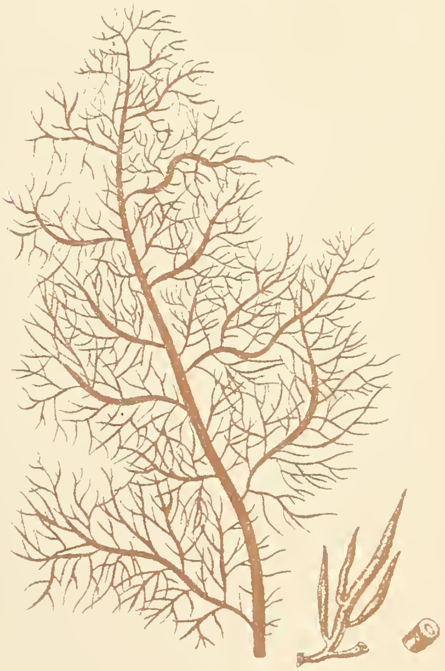
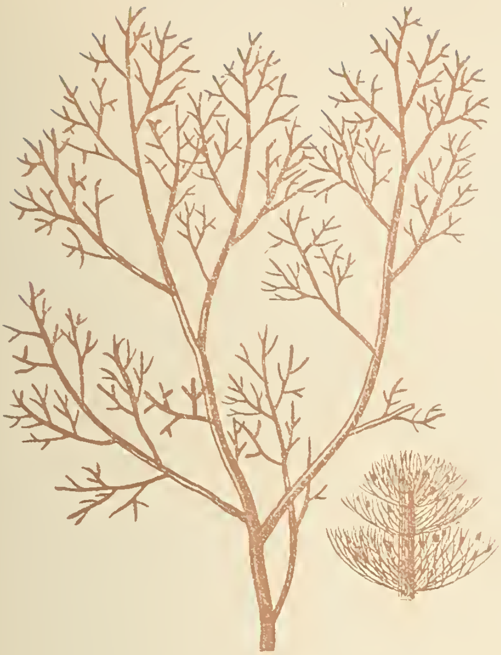
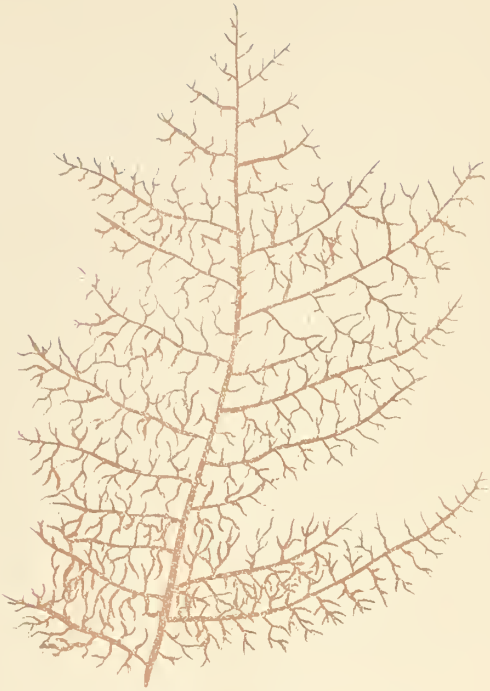

219.—Gloiosiphonia capillaris, *Carm.*

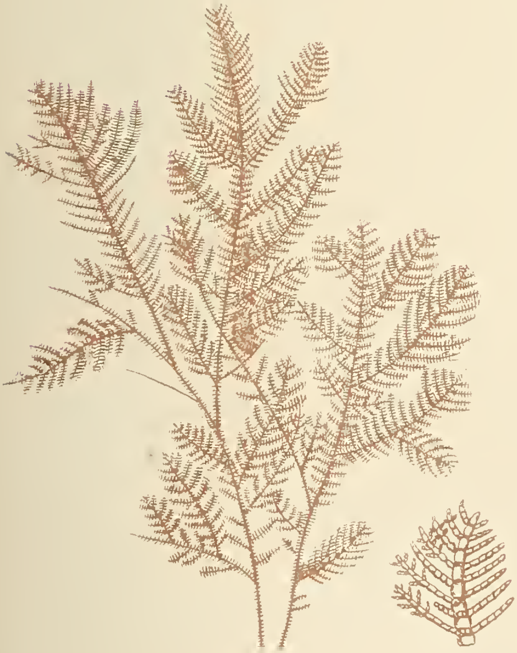
Plate XLIX.



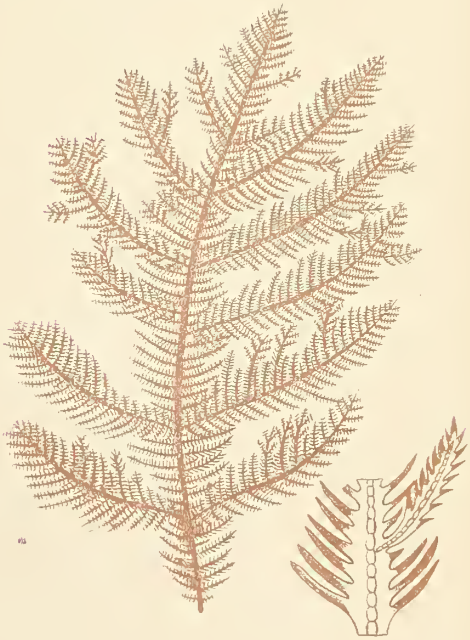
220.—Dudresnaia coccinea, *Bonnem.*



221.—Dudresnaia divaricata, *J. Ag.*

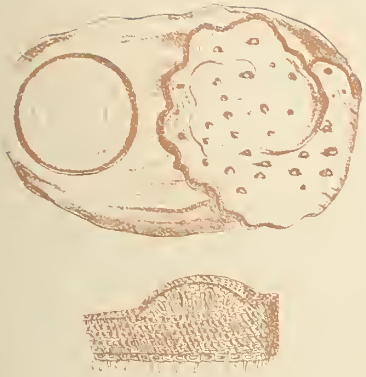


222.—Ptilota sericea, *Gmel.*

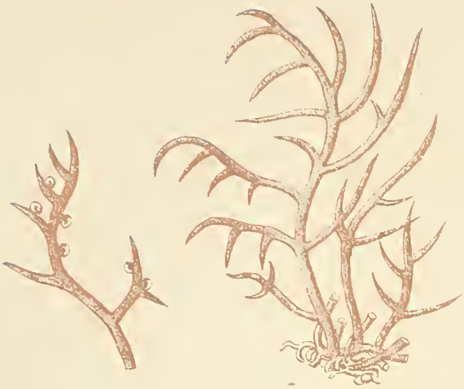


223.—Ptilota plumosa, *Ag.*

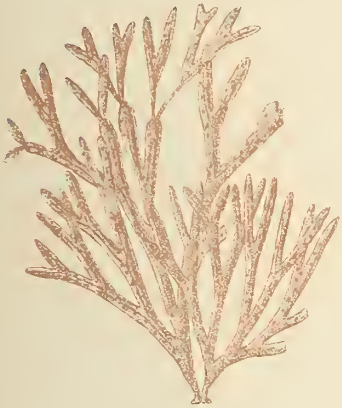
Plate L.



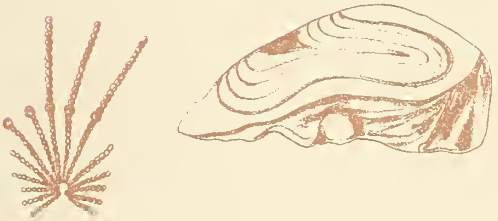
224.—Peyssonelia Dubyi, *Gouan.*



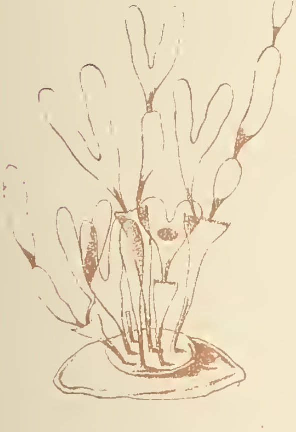
225.—Gigartina acicularis, *Lamour.*



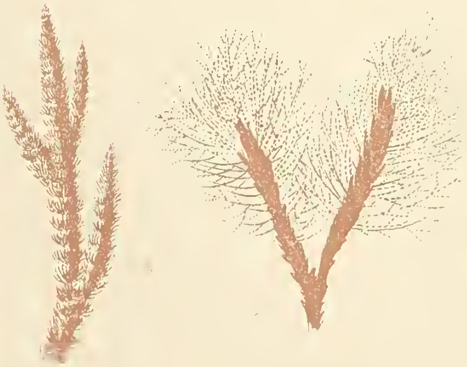
226.—Ginannia furcellata, *Mont.*



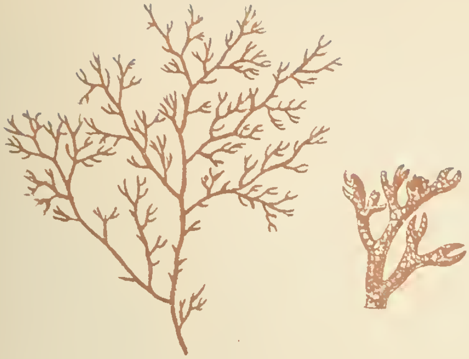
227.—Cruoria pellita, *Fries.*



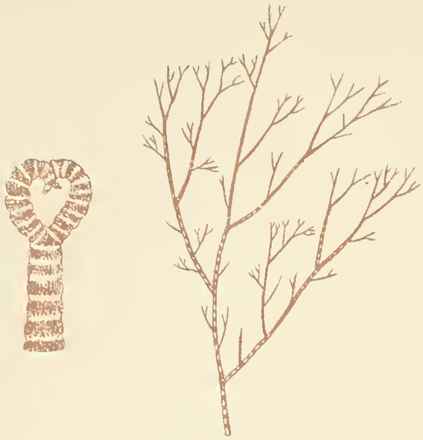
228.—Phyllophora Palmettoides, *J. Ag.*



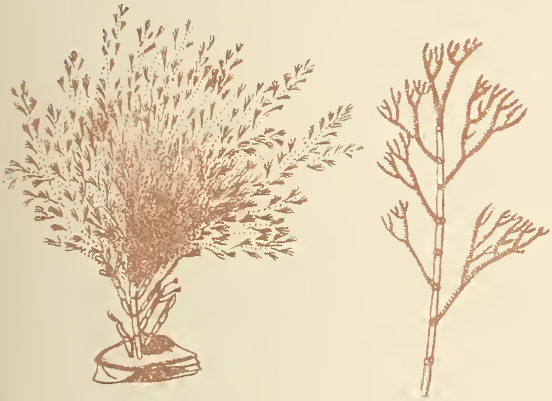
229.—Crouania attenuata, *J. Ag.*



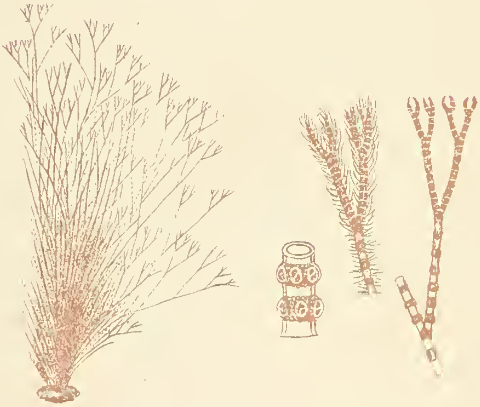
230.—Microcladia glandulosa, *Grev.*



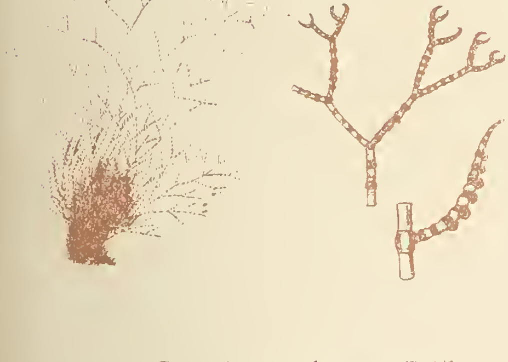
231.—Ceramium decurrens, *Kütz.*



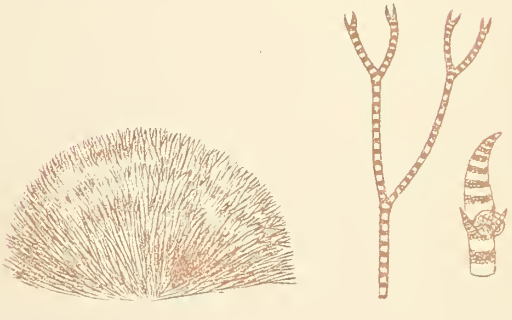
232.—Ceramium gracillimum, *Griff.*



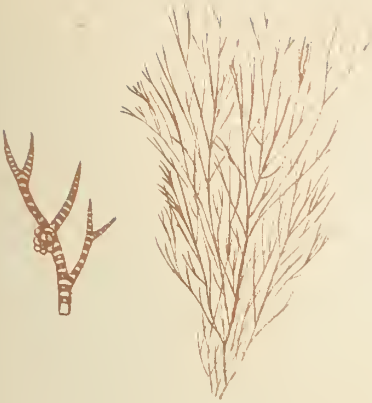
233.—Ceramium strictum, *Kütz.*



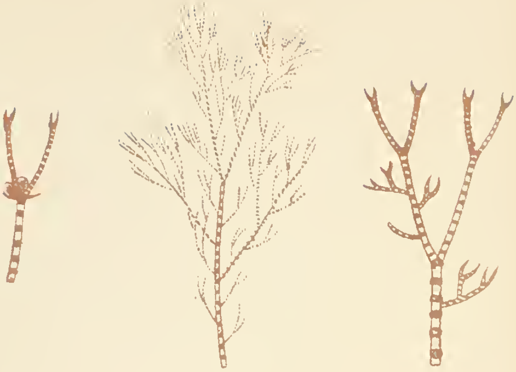
234.—Ceramium nodosum, *Griff*



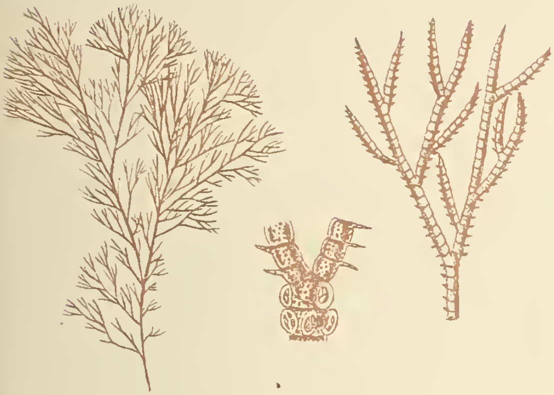
235.—Ceramium fastigiatum, *Harv.*



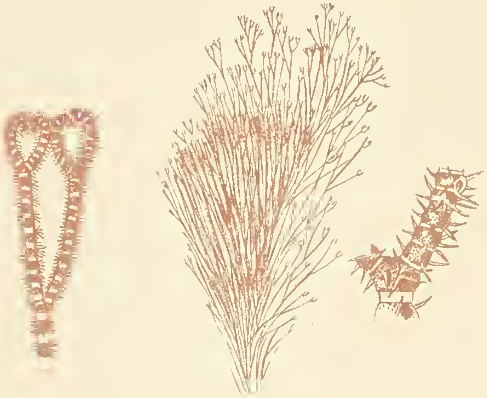
236.—Ceramium Deslongchampsii, *Chauv.*



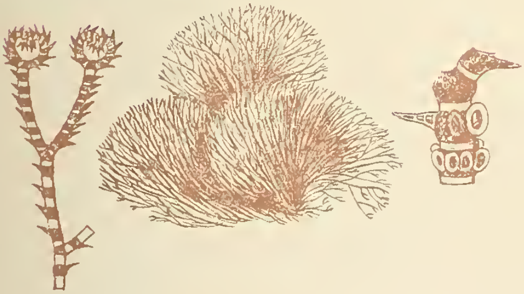
237.—Ceramium diaphanum, *Roth.*



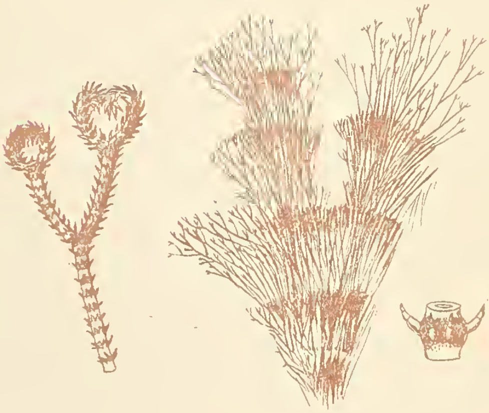
238.—Ceramium flabelligerum, *J. Ag.*



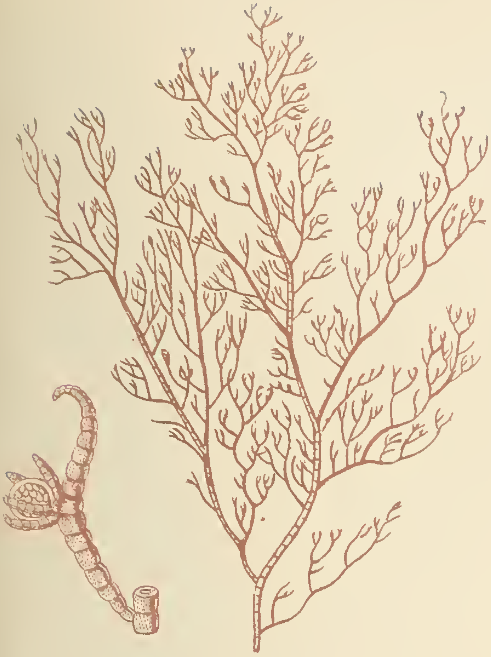
239.—Ceramium echionotum, *J. Ag.*



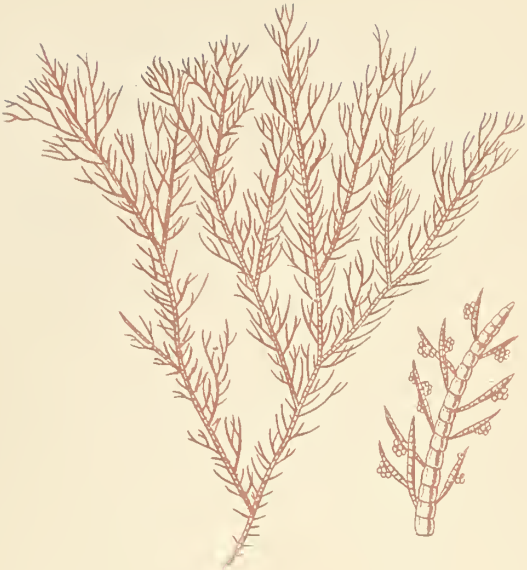
240.—Ceramium acanthonotum, *Carm.*



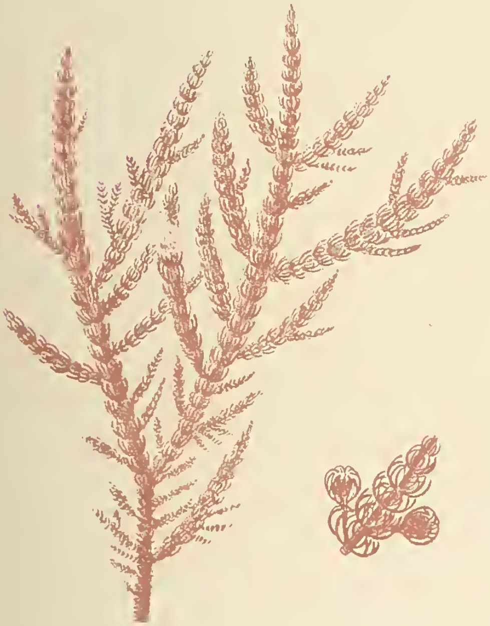
241.—Ceramium ciliatum, *Ducluz.*



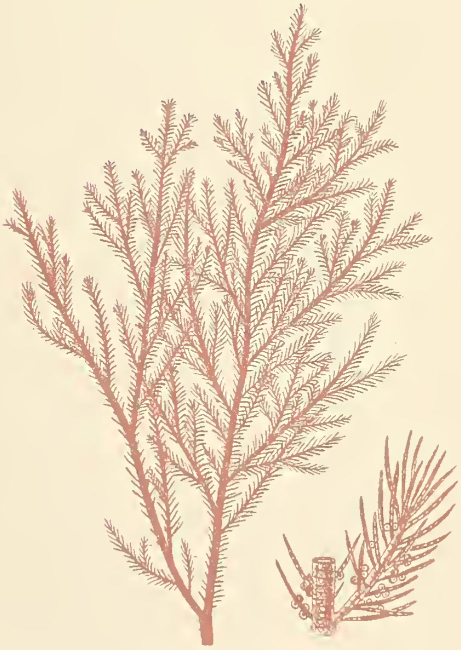
242.—Ceramium rubrum, *Ag.*



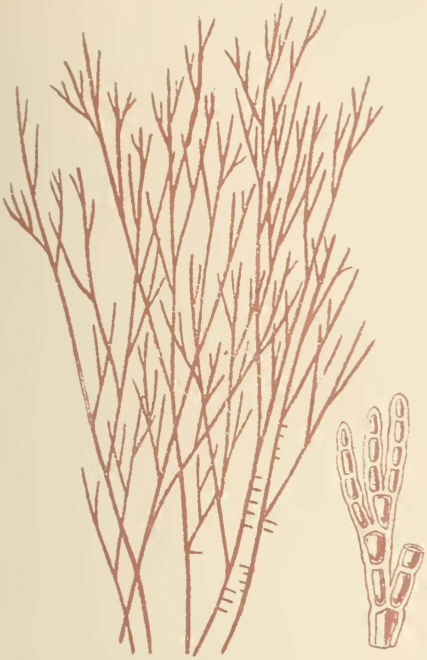
243.—Ceramium botryocarpum, *Griff.*



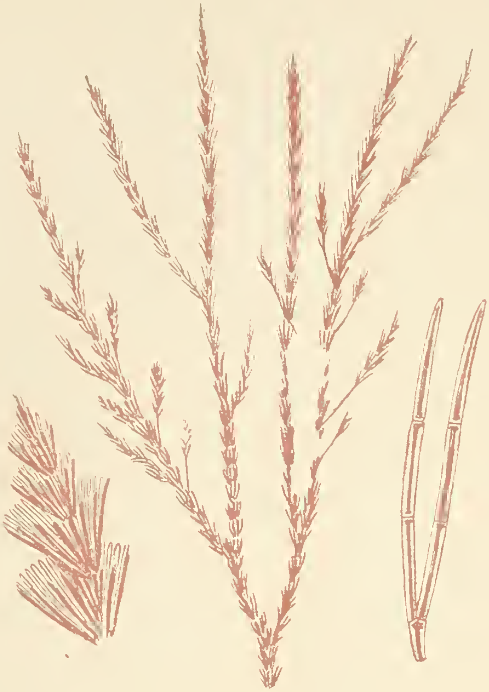
244.—Griffithsia equisetifolia, *Ag.*



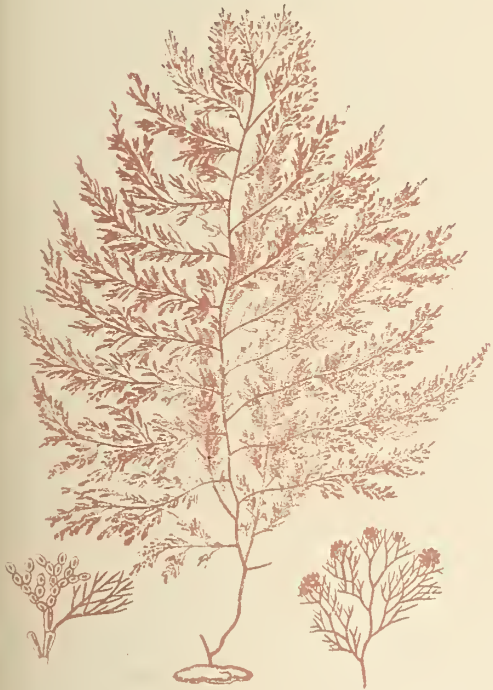
245.—Spyridia filamentosa, *Harv.*



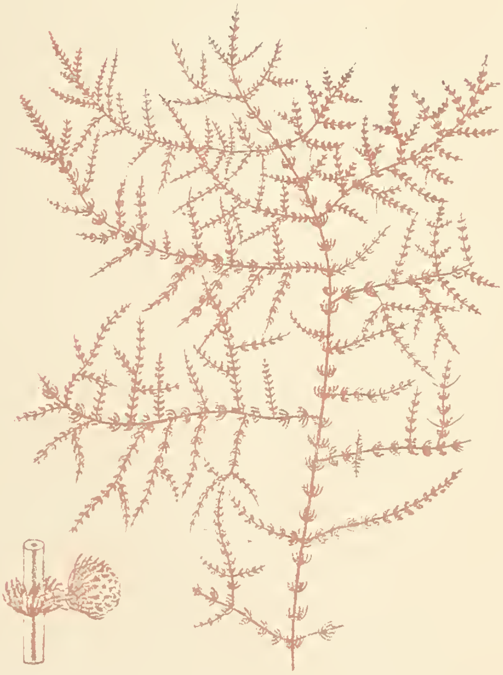
246.—Griffithsia secundiflora, *J. Ag.*



247.—Griffithsia simplicifilum, *Ag.*

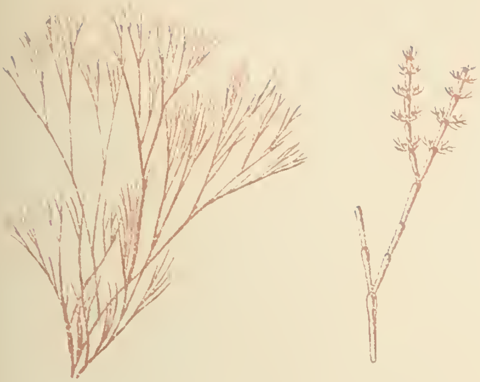


248.—Seirospora Griffithsiana, *Harv.*

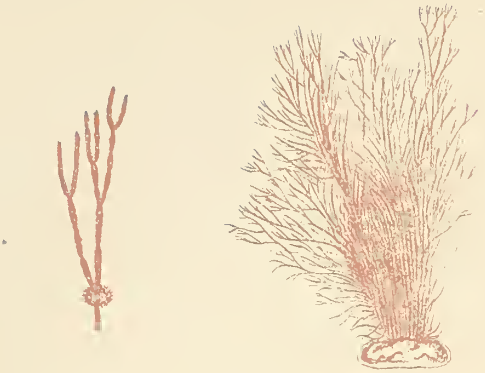


249.—Wrangelia multifida, *J. Ag.*

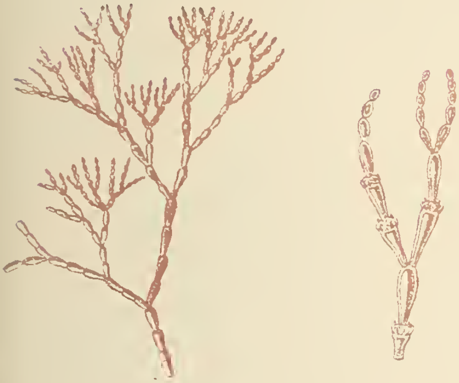
Plate LV.



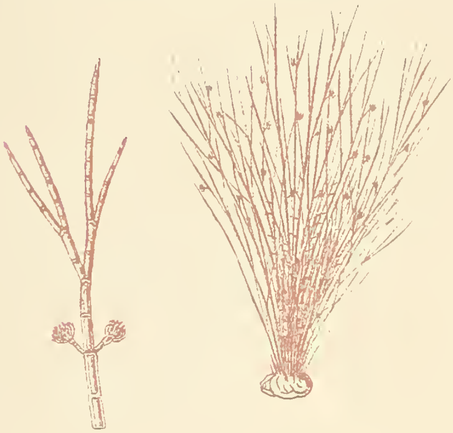
250.—Griffithsia barbata, *Ag.*



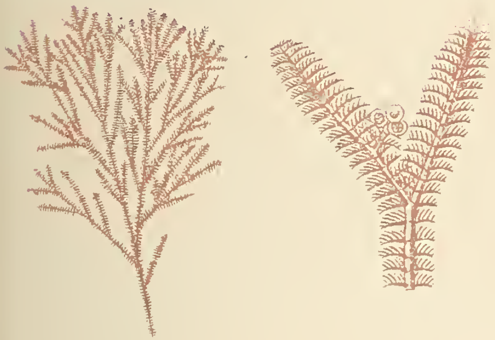
251.—Griffithsia Devoniensis, *Harv.*



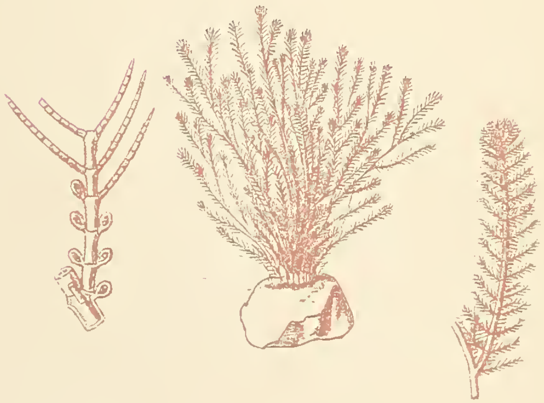
252.—Griffithsia corallina, *Ag.*



253.—Griffithsia setacea, *Ag.*

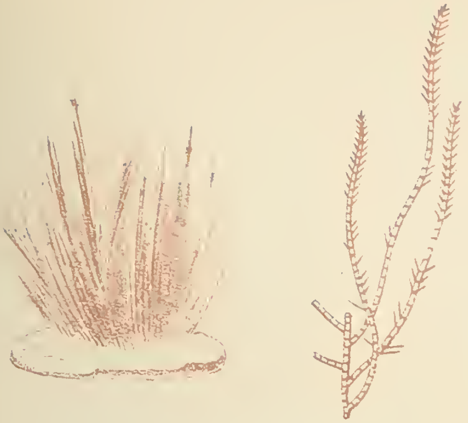


254.—Callithamnion plumula, *Lyngb.*

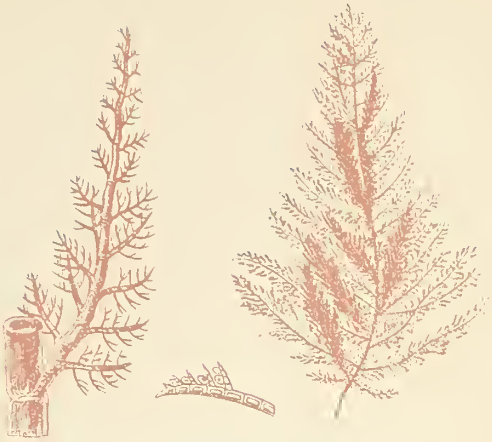


255.—Callithamnion cruciatum, *Ag.*

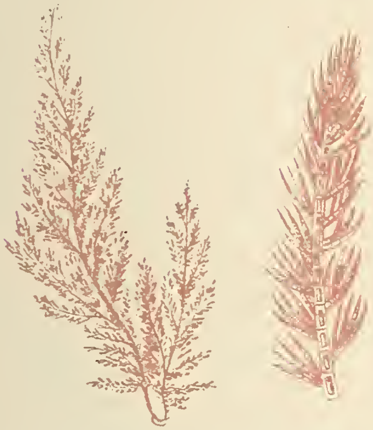
Plate LVI.



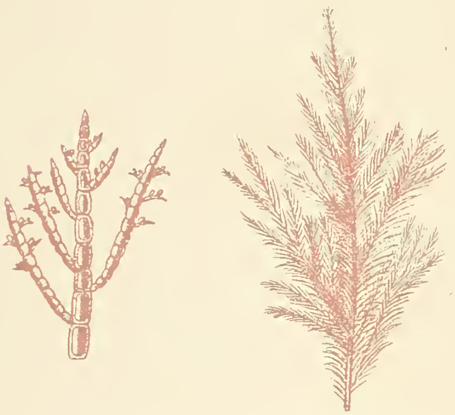
256.—Callithamnion barbatum, *Ag.*



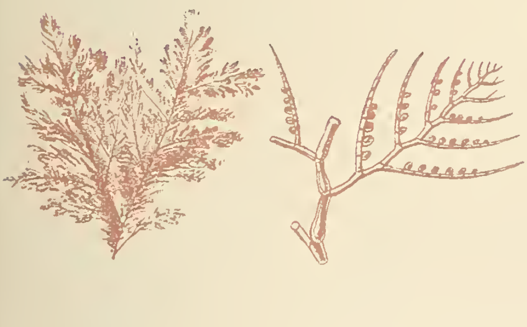
257.—Callithamnion Brodiæi, *Harv.*



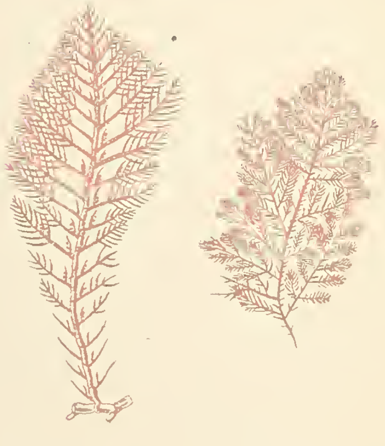
258.—Callithamnion brachiatum, *Bonnem.*



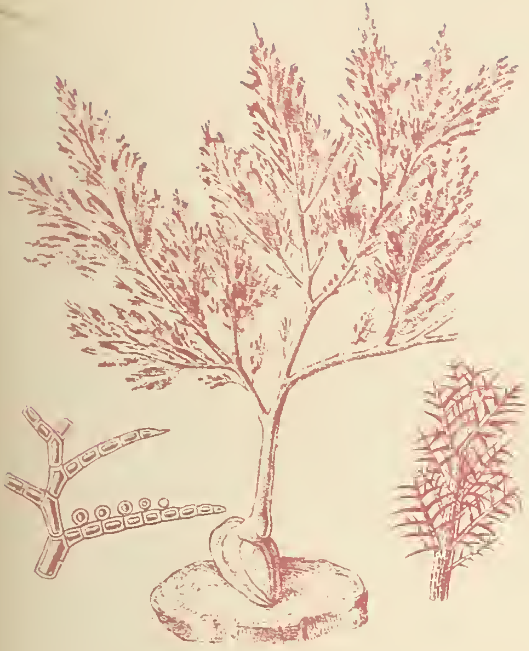
259.—Callithamnion tetricum, *Ag.*



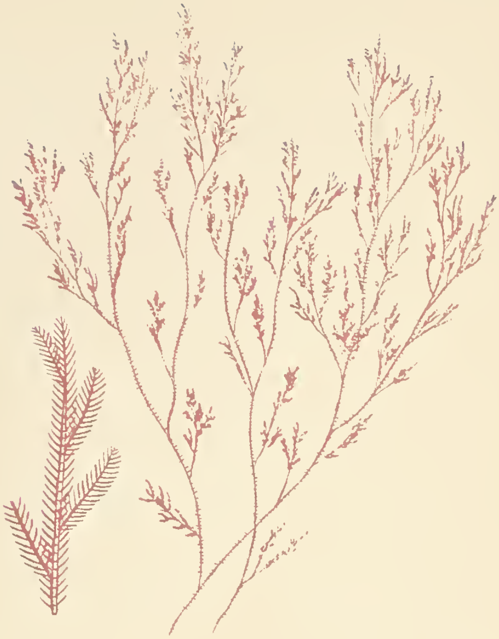
260.—Callithamnion roseum, *Lyngb.*



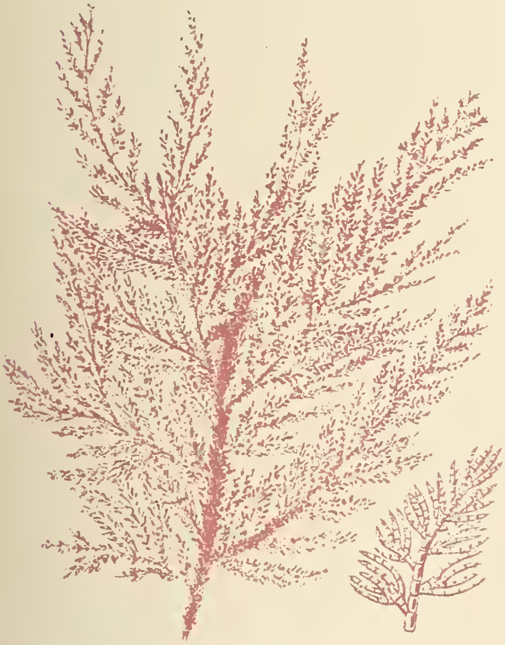
261.—Callithamnion tripinnatum, *Ag.*



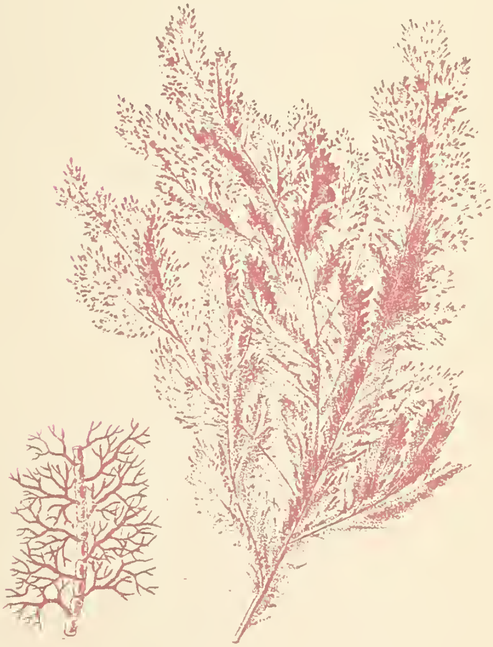
262.—Callithamnion arbuscula, *Lyngb.*



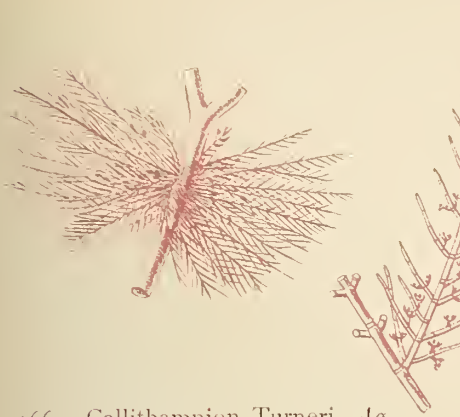
263.—Callithamnion floccosum, *Ag.*



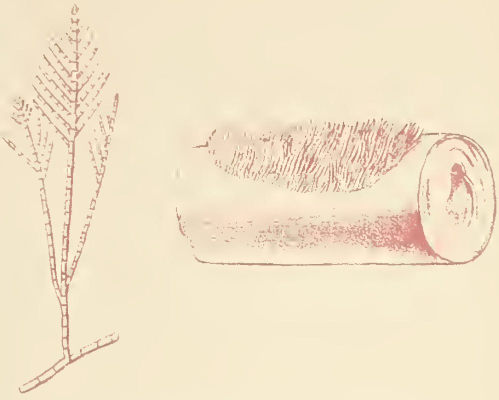
264.—Callithamnion tetragonum, *Ag.*



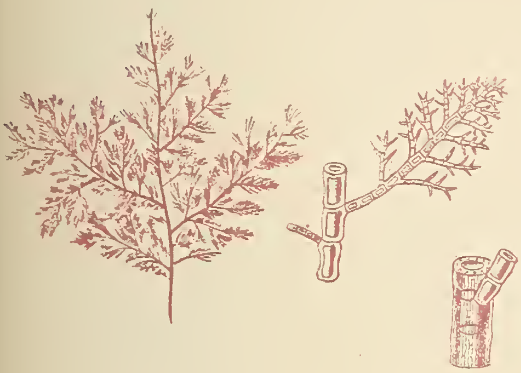
265.—Callithamnion spongiosum, *Harv.*



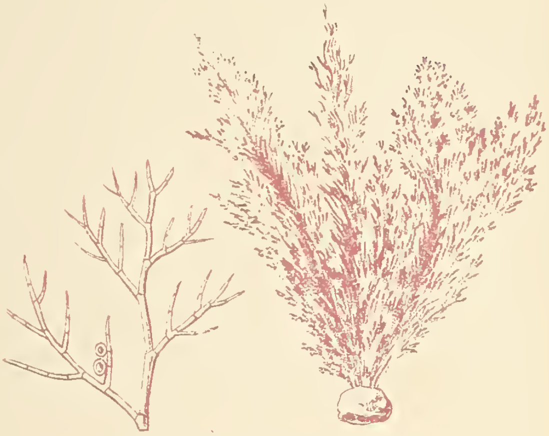
266.—Callithamnion Turneri, *Ag.*



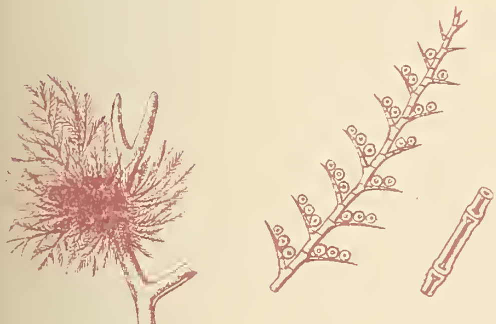
267.—Callithamnion pluma, *Ag.*



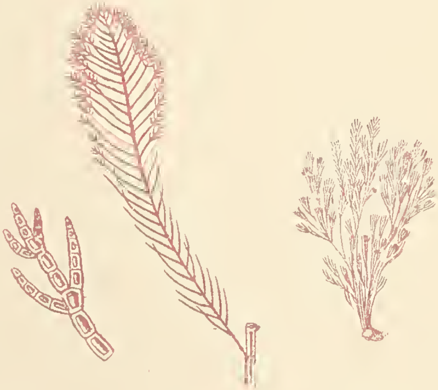
268.—Callithamnion Hookeri, *Ag.*



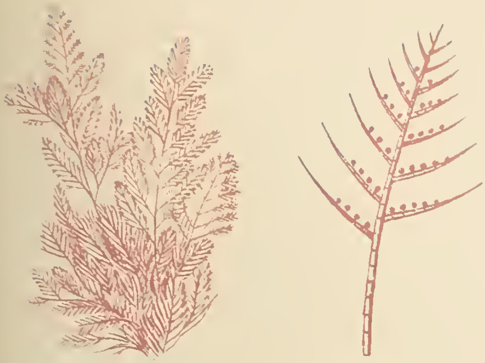
269.—Callithamnion byssoideum, *Arn.*



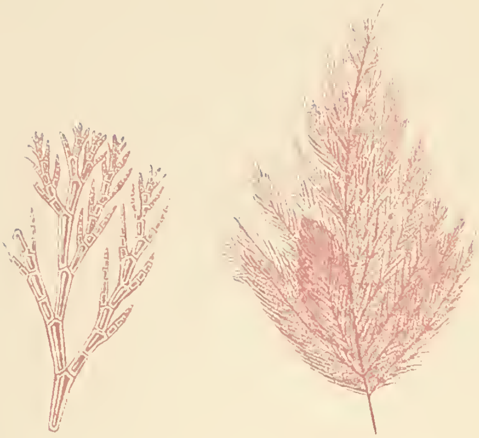
270.—Callithamnion polyspermum, *Ag.*



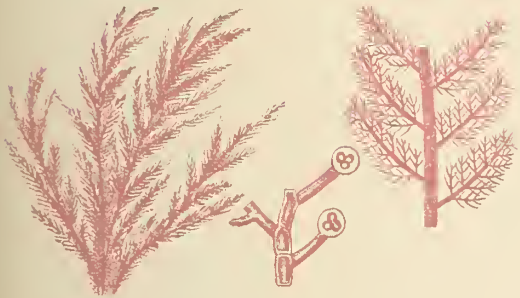
271.—Callithamnion fasciculatum, *Harv.*



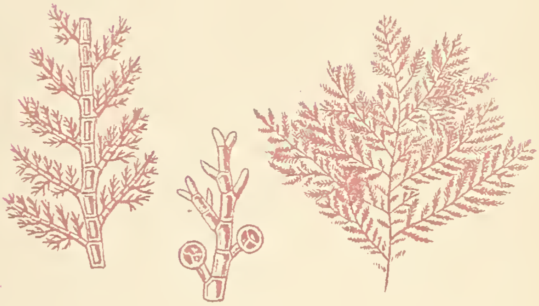
272.—Callithamnion Borreri, *Ag.*



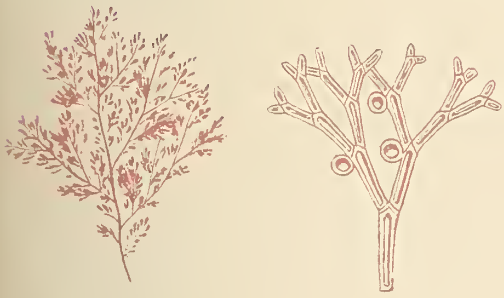
273.—Callithamnion affine, *Harv.*



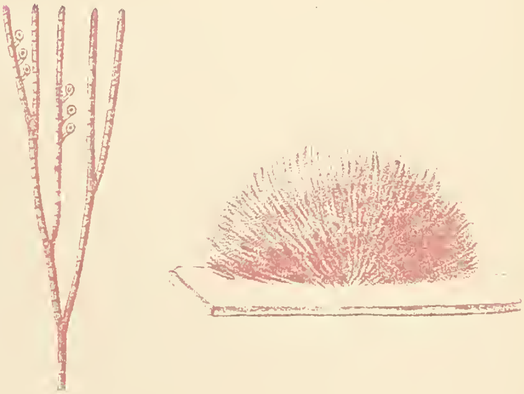
274.—Callithamnion gracillimum, *Ag.*



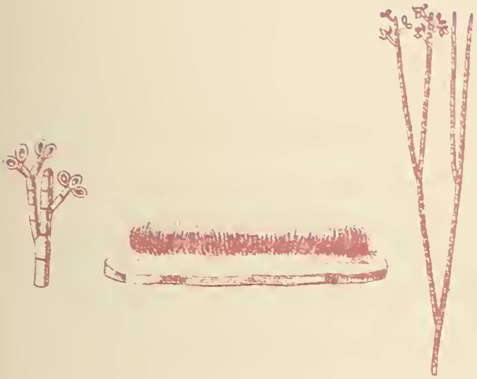
275.—Callithamnion thuyoideum, *Ag.*



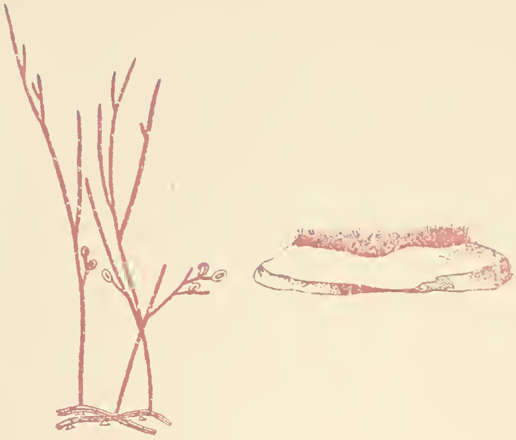
276.—Callithamnion corymbosum, *Ag.*



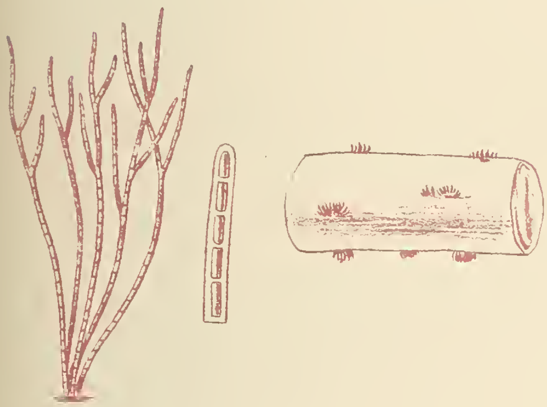
277.—Callithamnion floridulum, *Ag.*



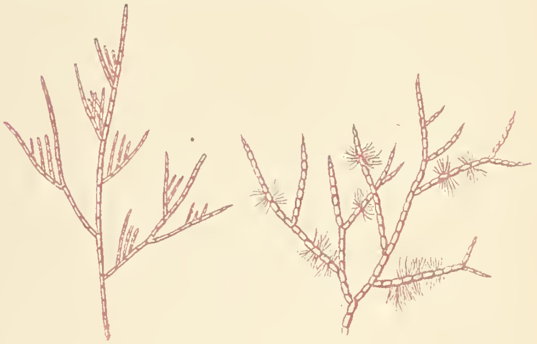
278.—Callithamnion Rothii, *Lyngb.*



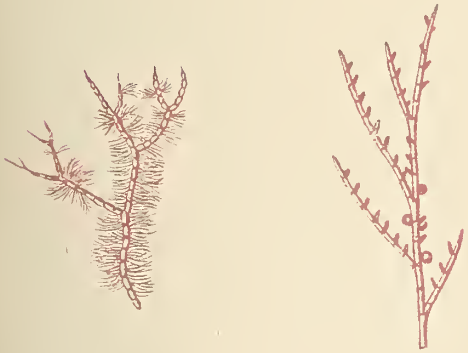
279.—Callithamnion mesocarpum, *Carm.*



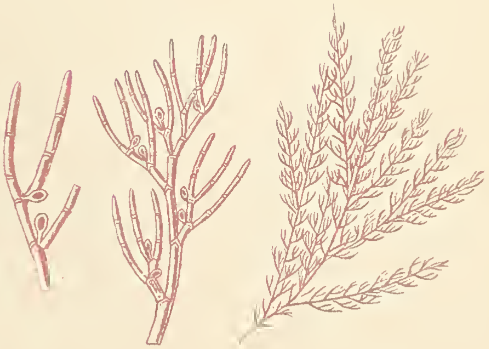
280.—Callithamnion sparsum, *Harv.*



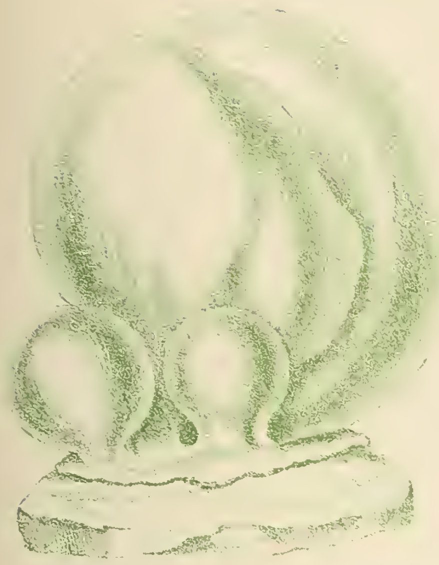
281.—Callithamnion Daviesii, *Lyngb.*



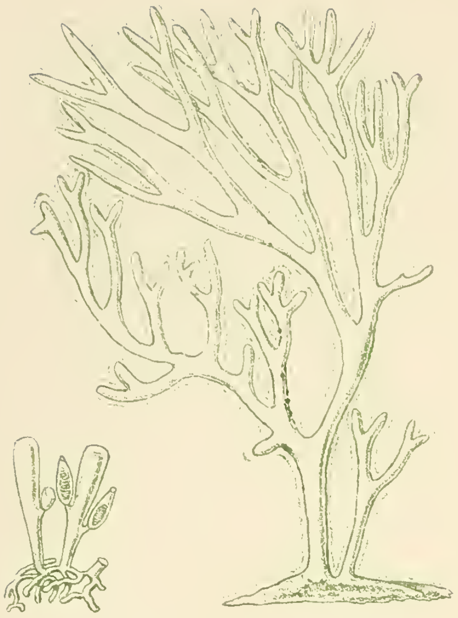
282.—Callithamnion virgatulum, *Harv.*



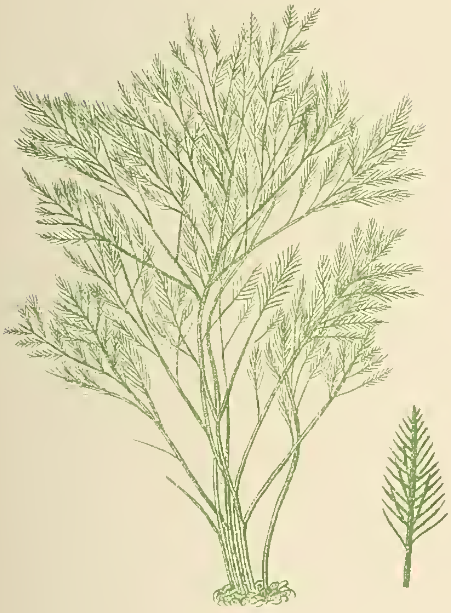
283.—Callithamnion pedicellatum, *Ag.*



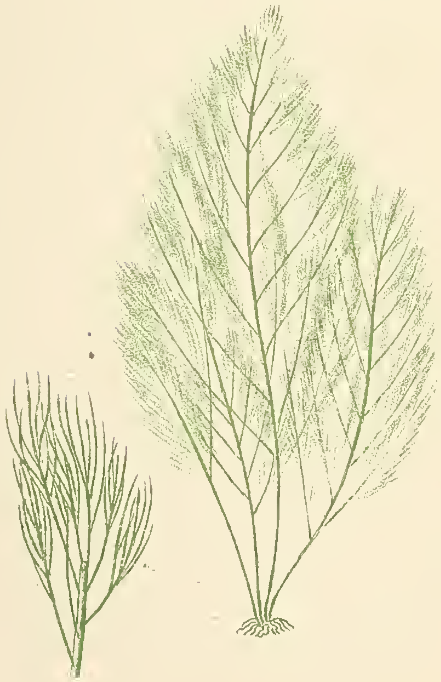
284.—Codium Bursa, *Ag.*



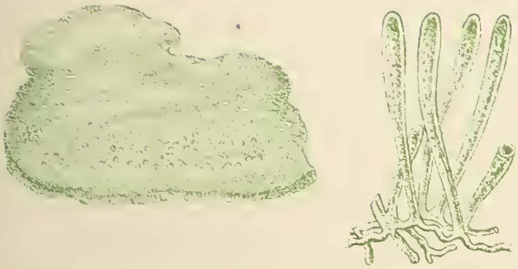
285.—Codium tomentosum, *Stack.*



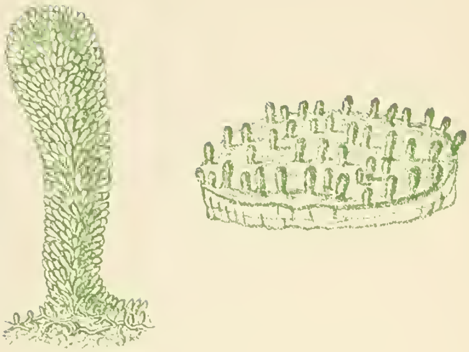
286.—Bryopsis plumosa, *Ag.*



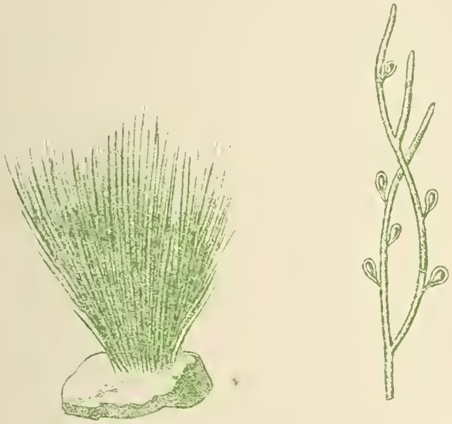
287.—Bryopsis hypnoides, *Lamour.*



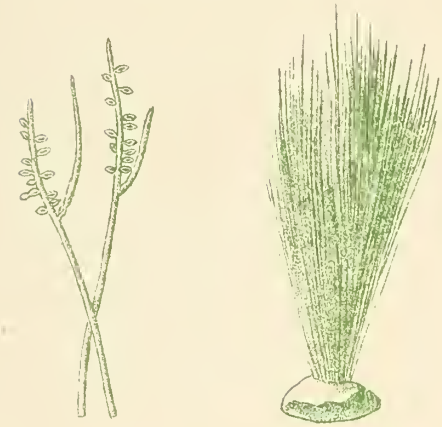
288.—Codium adhærens, *Ag.*



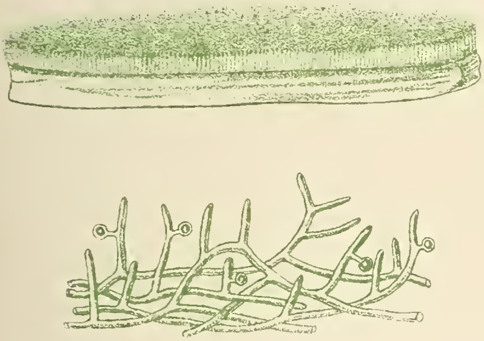
289.—Codium amphibium, *Moore.*



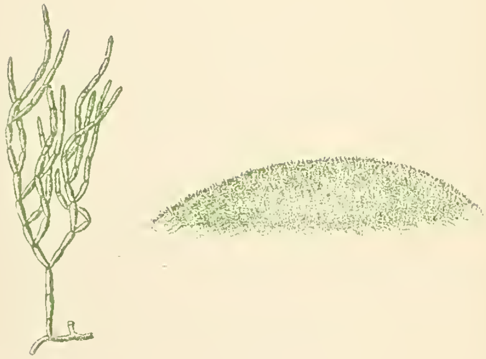
290.—Vaucheria marina, *Lyngb.*



291.—Vaucheria submarina, *Berk.*

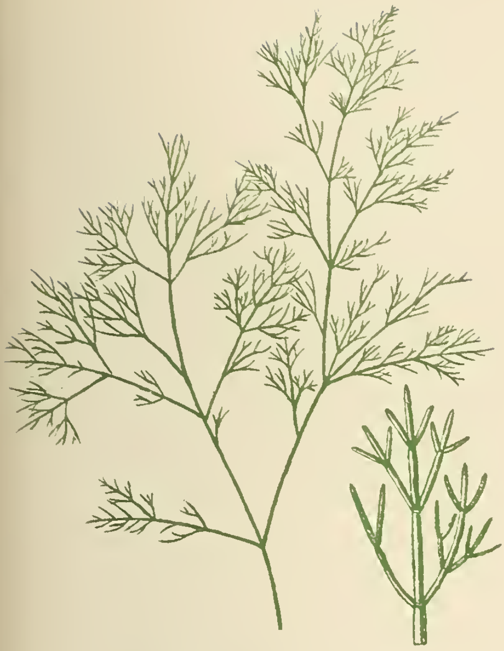


292.—Vaucheria velutina, *Ag.*

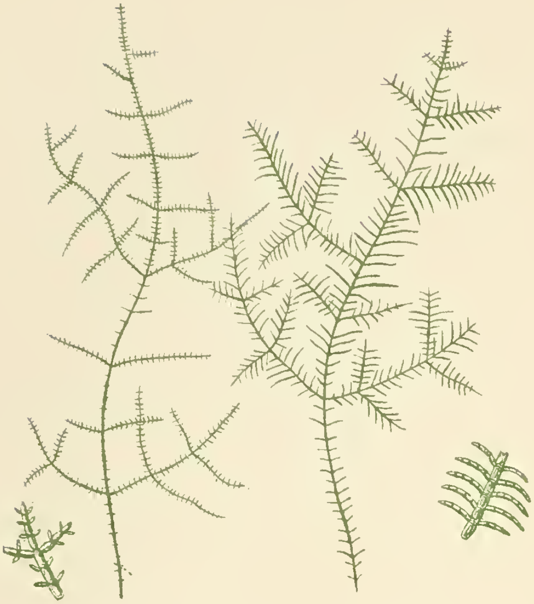


293.—Cladophora Brownii, *Harv.*

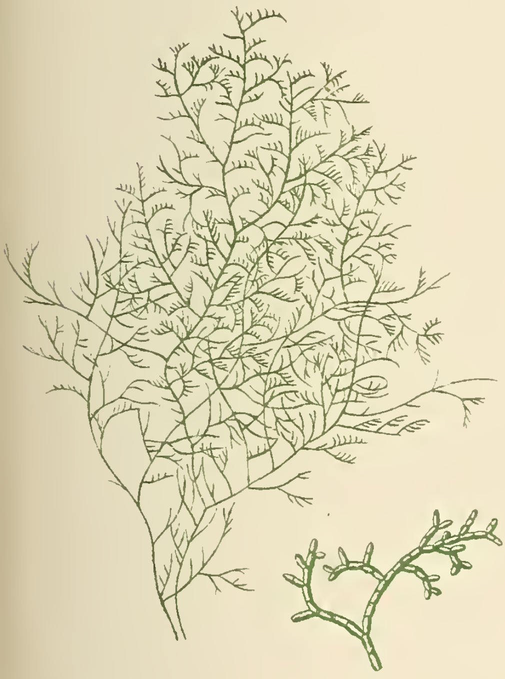
Plate LXIII.



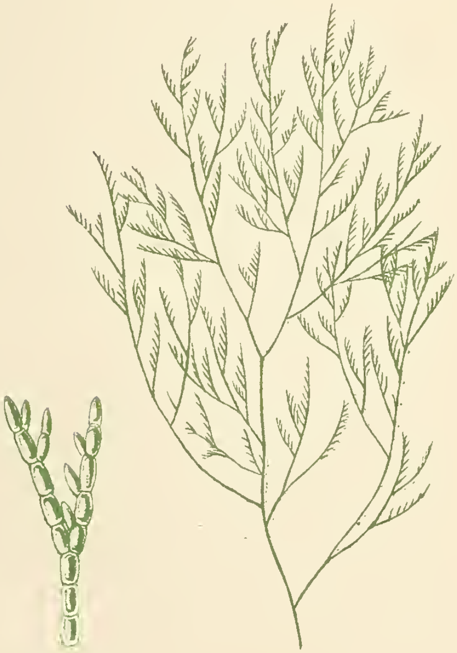
294.—Cladophora pellucida, *Kütz.*



295.—Cladophora rectangularis, *Griff.*

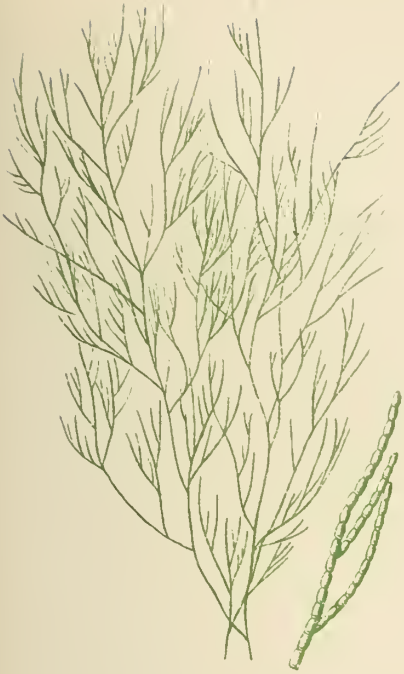


296.—Cladophora Macallana, *Harv.*

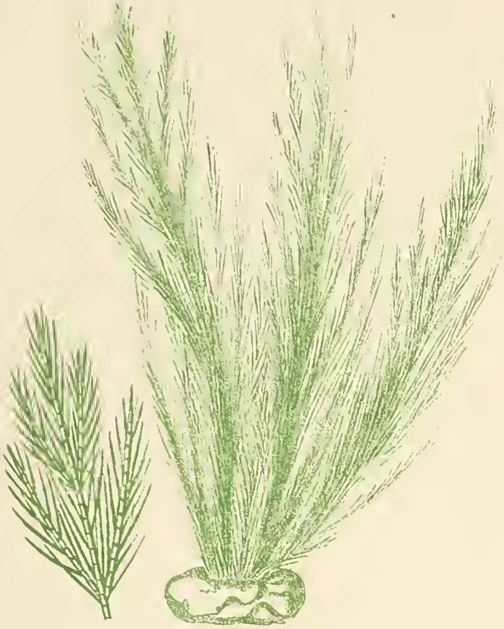


297.—Cladophora Hutchinsiæ, *Harv.*

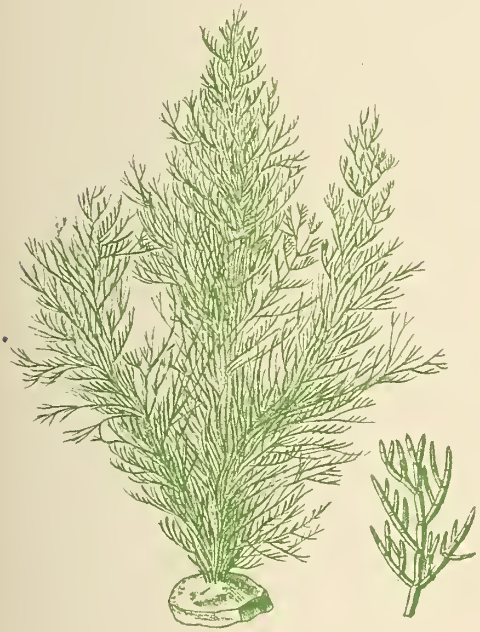
Plate LXIV.



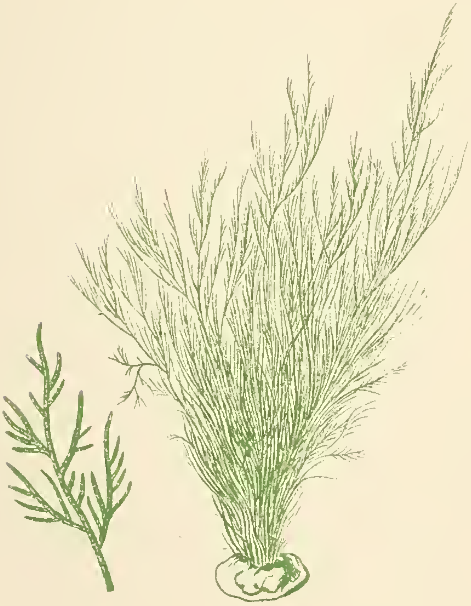
298.—Cladophora diffusa, *Harv.*



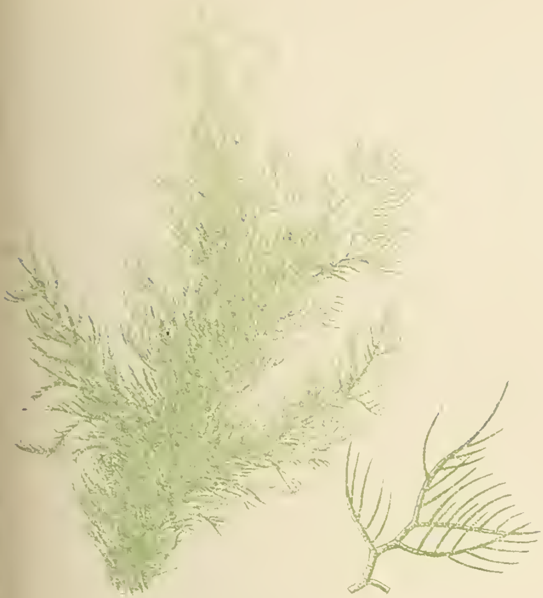
299.—Cladophora rupestris, *Kütz.*



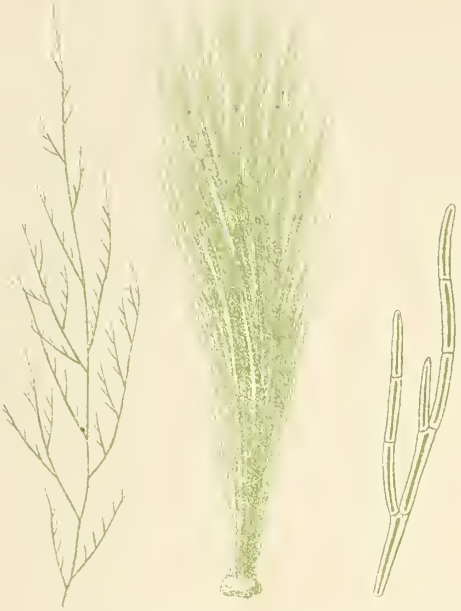
300.—Cladophora lætevirens, *Kütz.*



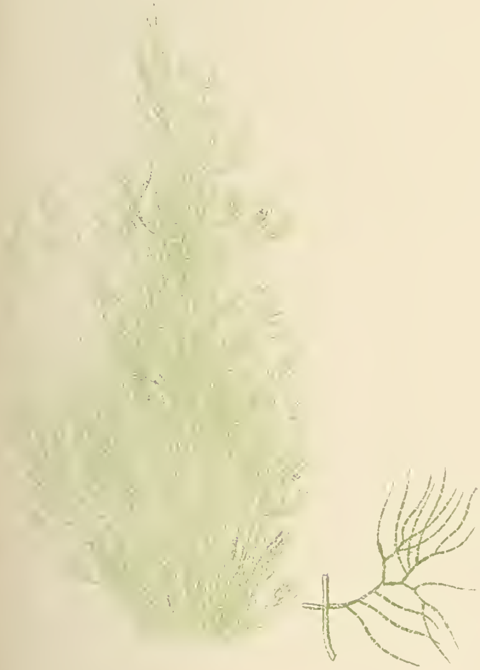
301.—Cladophora flexuosa, *Griff.*



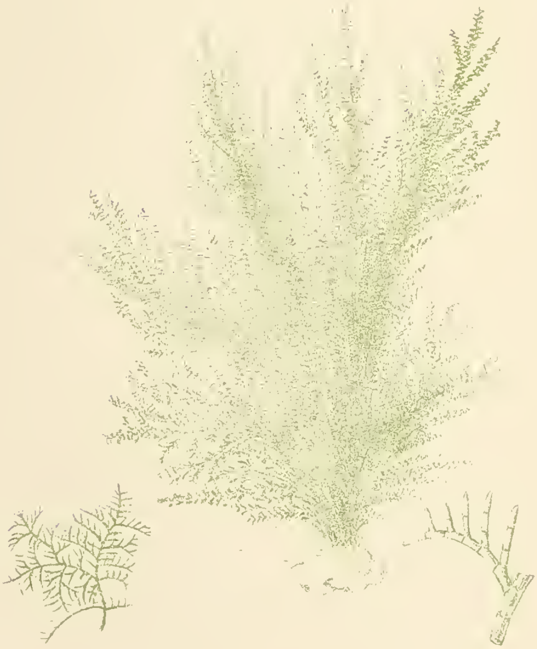
302.—Cladophora gracilis, *Griff.*



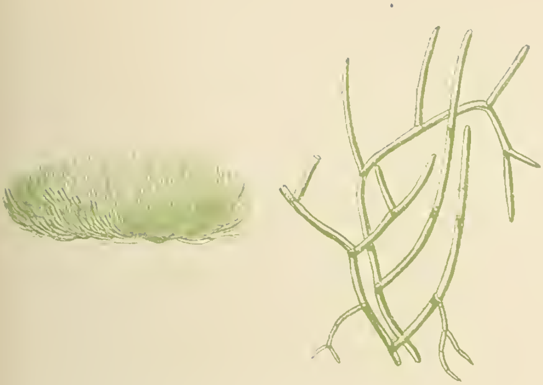
303.—Cladophora Balliana, *Harv.*



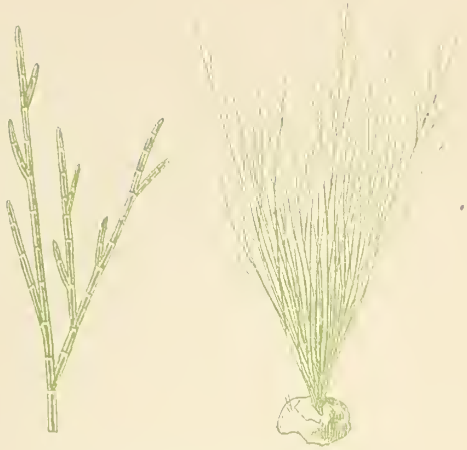
304.—Cladophora Rudolphiana, *Kütz.*



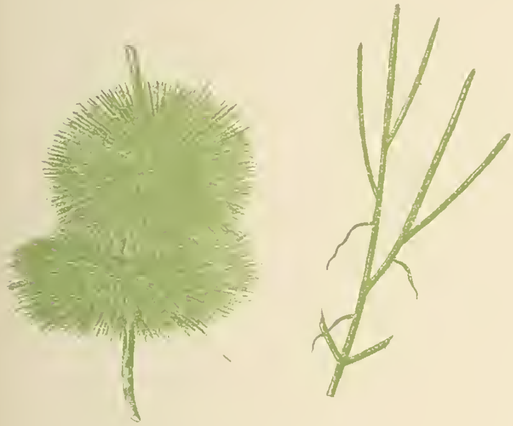
305.—Cladophora refracta, *Kütz.*



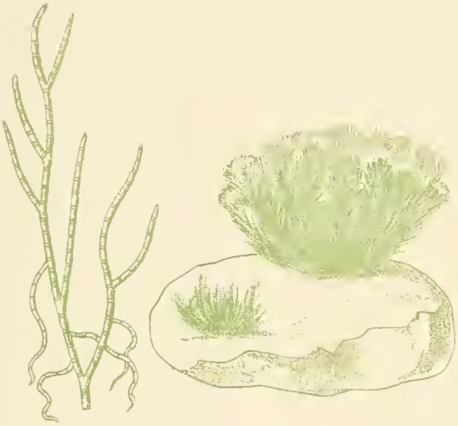
306.—Cladophora repens, *J. Ag.*



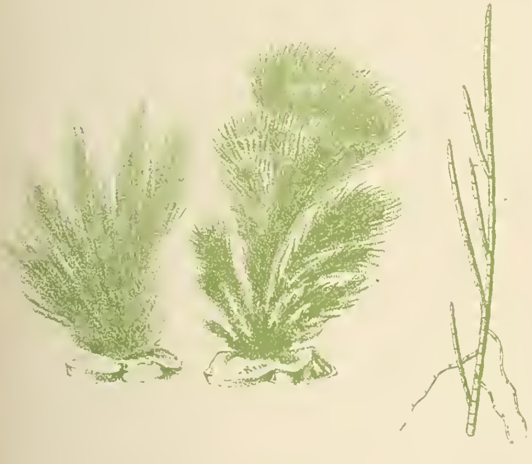
307.—Cladophora nuda, *Harv.*



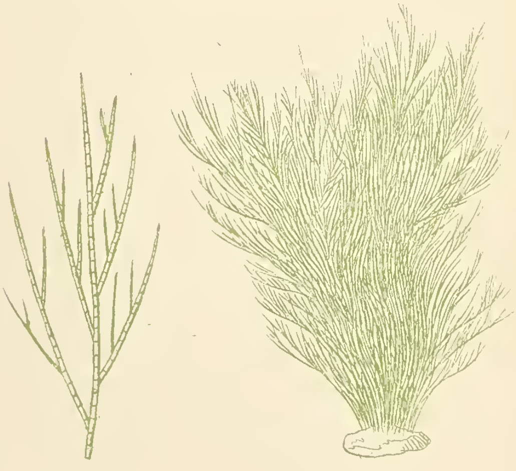
308.—Cladophora lanosa, *Kütz.*



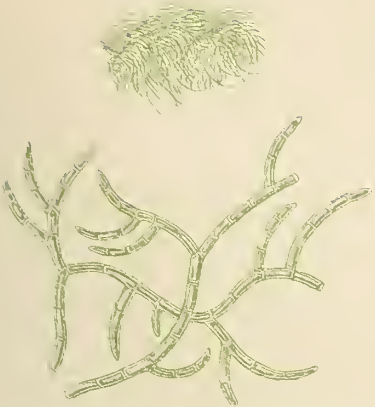
309.—Cladophora uncialis, *Harv.*



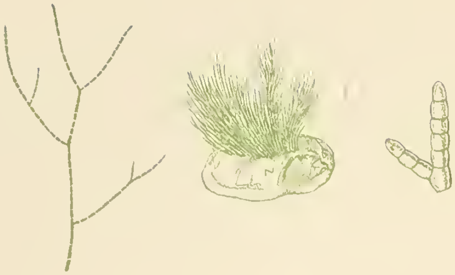
310.—Cladophora arcta, *Kütz.*



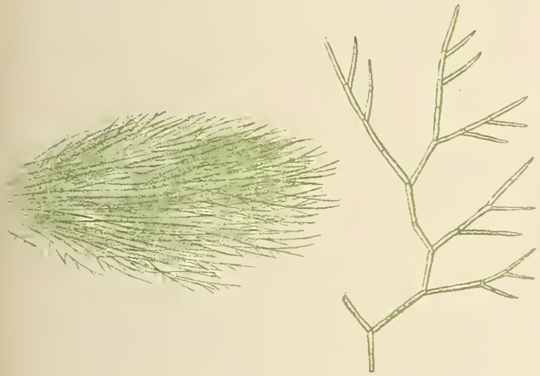
311.—Cladophora glaucescens, *Griff.*



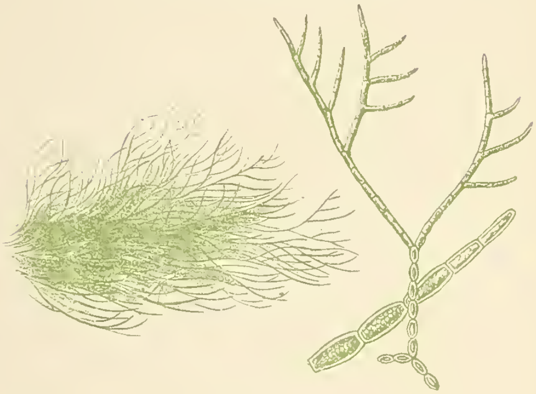
312.—Cladophora Magdalenæ, *Harv.*



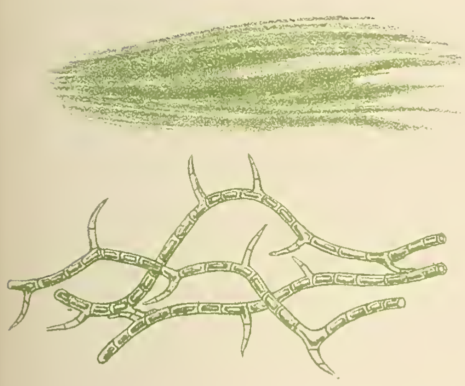
313.—Cladophora Gattyæ, *Harv.*



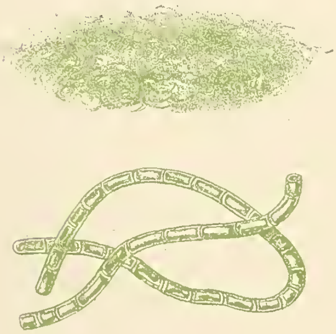
314.—Cladophora flavenscens, *Kütz.*



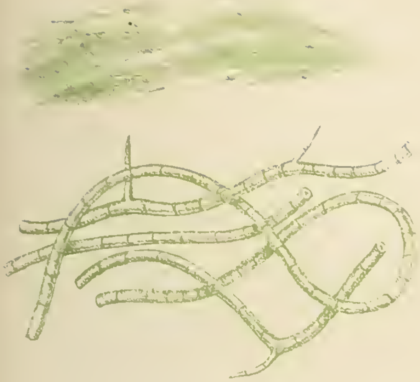
315.—Cladophora fracta, *Kütz.*



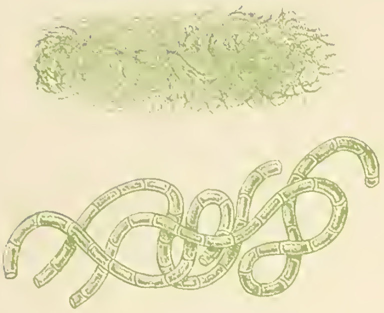
316.—Rhizoclonium riparium, *Kütz.*



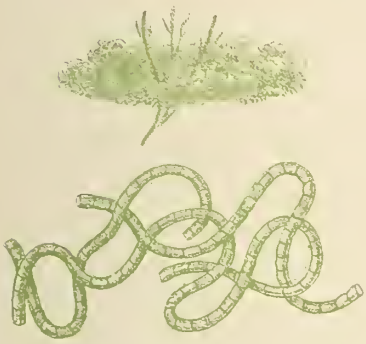
317.—Conferva arenicola, *Berk.*



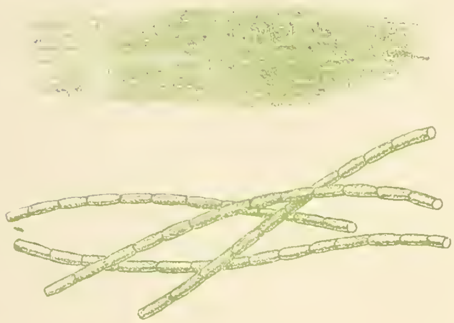
318.—Rhizoclonium Casparyi, *Harv.*



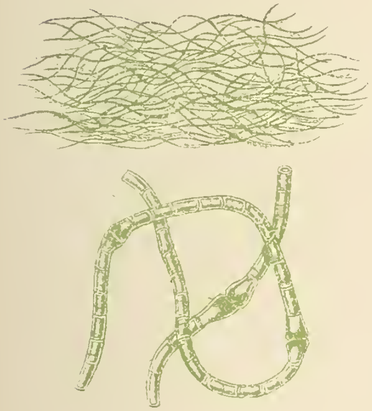
319.—Conferva tortuosa, *Dillw.*



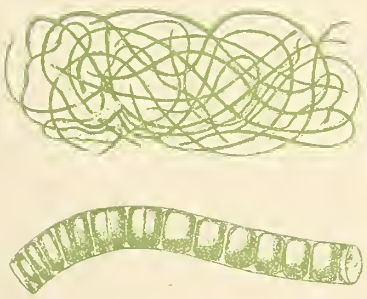
320.—Conferva implexa, *Dillw.*



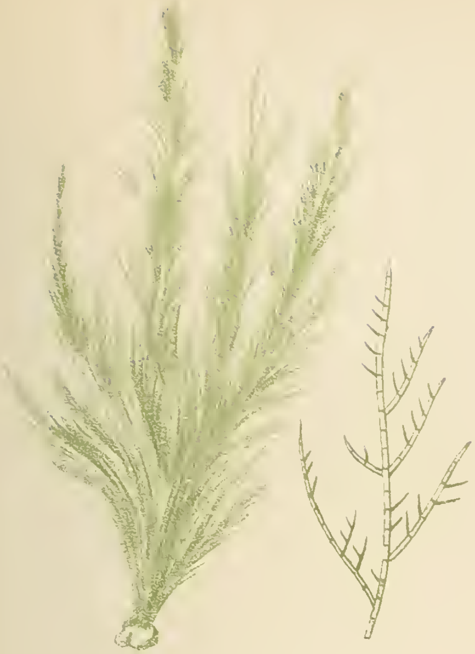
321.—Conferva arenosa, *Carm.*



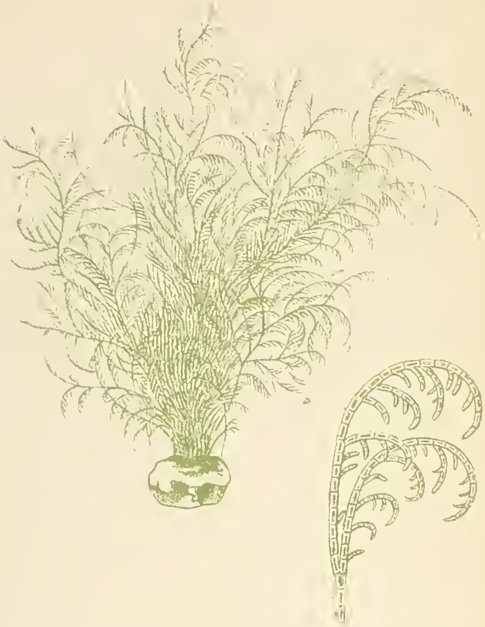
322.—Conferva litorea, *Harv.*



323.—Conferva linum, *Roth.*

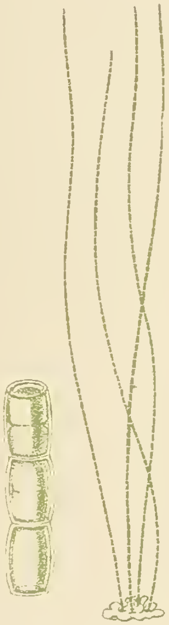


324.—Cladophora albida, *Kütz.*

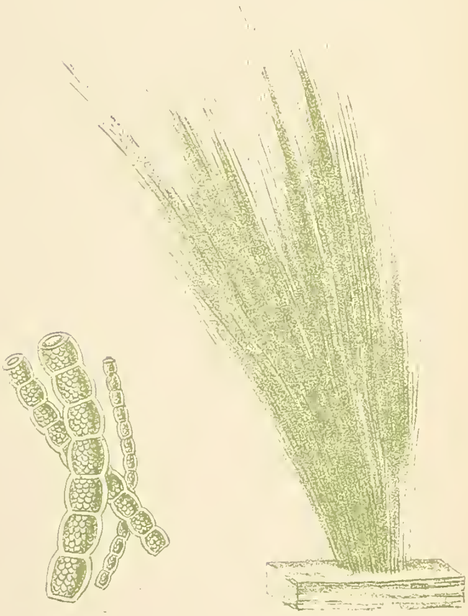


325.—Cladophora falcata, *Harv.*

326 a.—Conferva (ærea, *Dillw.*)

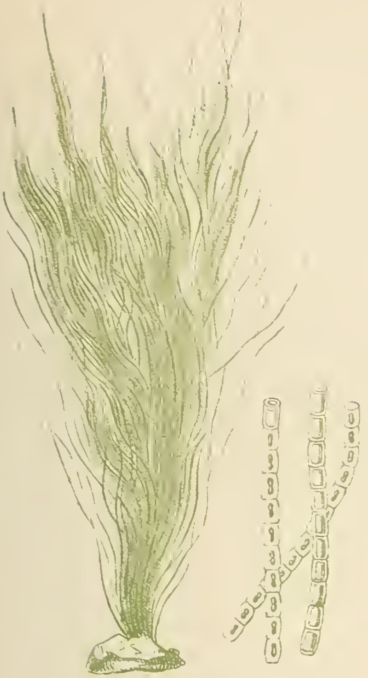


326 b.—C. (melagonium, *Web.*)

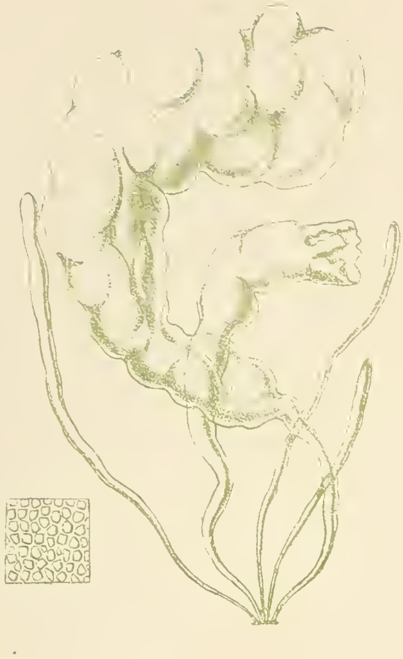


327.—Conferva collabens, *Ag.*

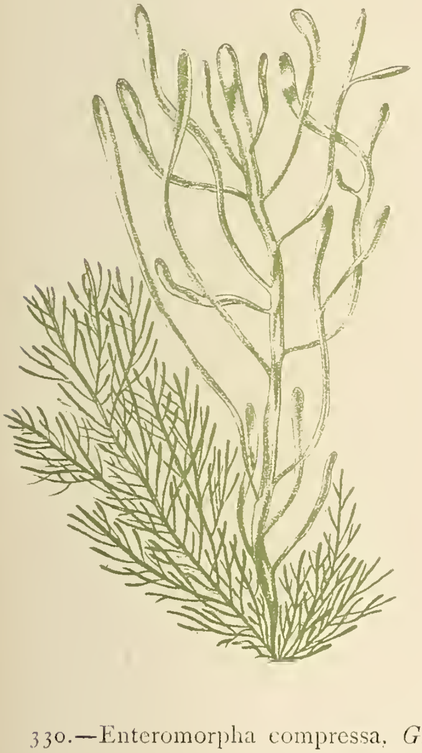
Plate LXX.



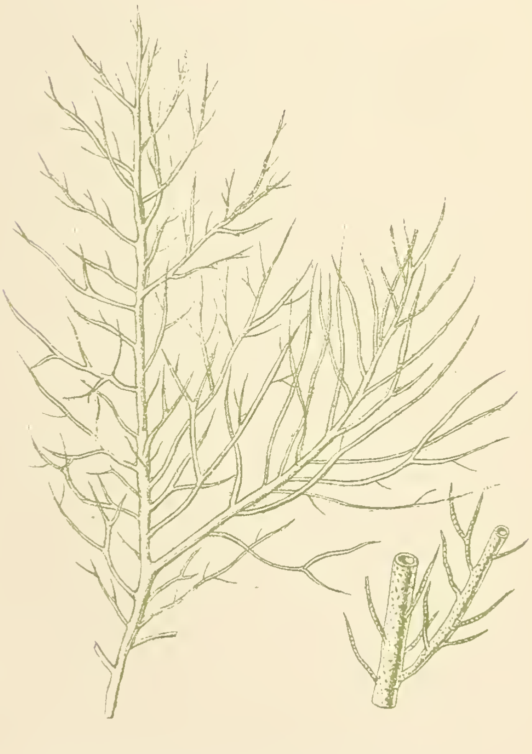
328.—Conferva bangioides, *Harv.*



329.—Enteromorpha intestinalis, *Link.*

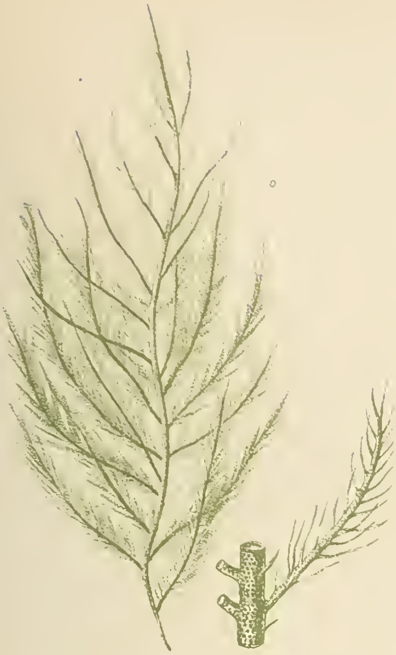


330.—Enteromorpha compressa, *Grev.*

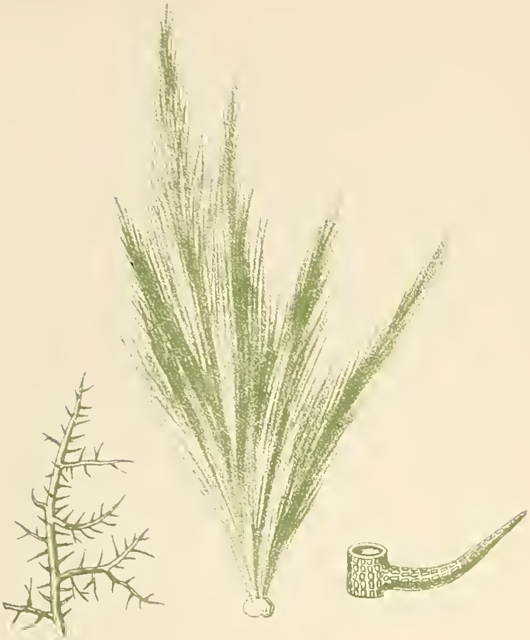


331.—Enteromorpha Linkiana, *Grev.*

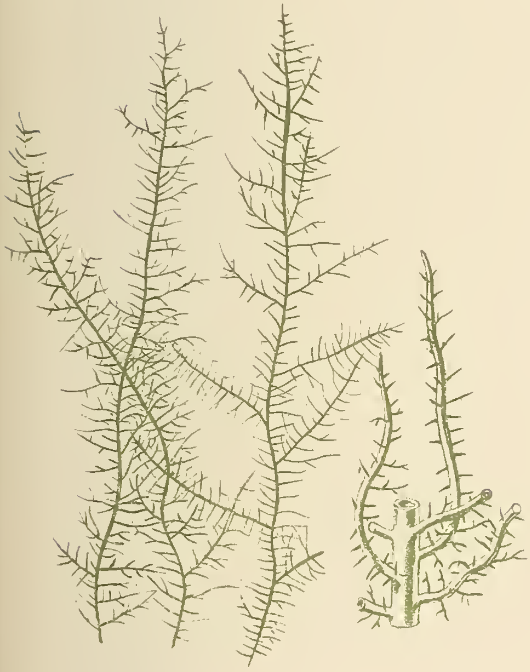
Plate LXXI.



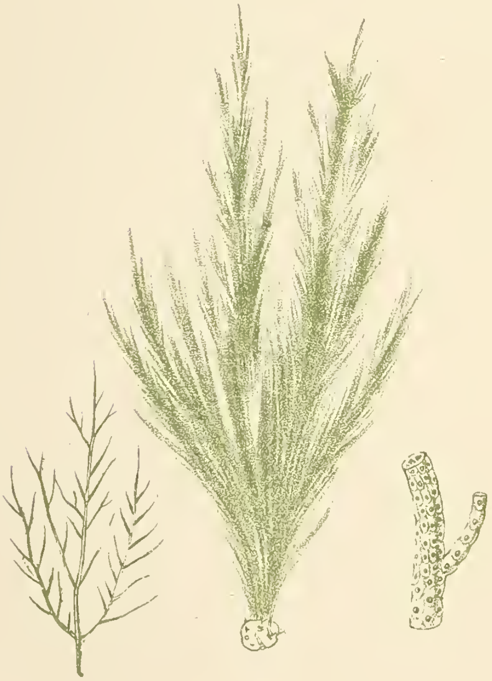
332.—Enteromorpha erecta, *Hook.*



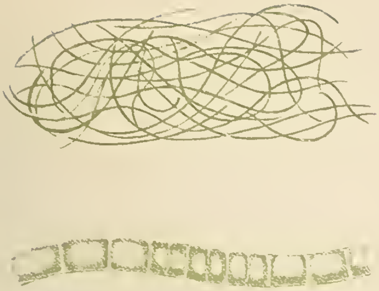
333.—Enteromorpha clathrata, *Grev.*



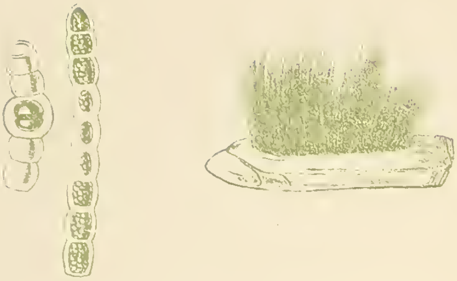
334.—Enteromorpha ramulosa, *Hook.*



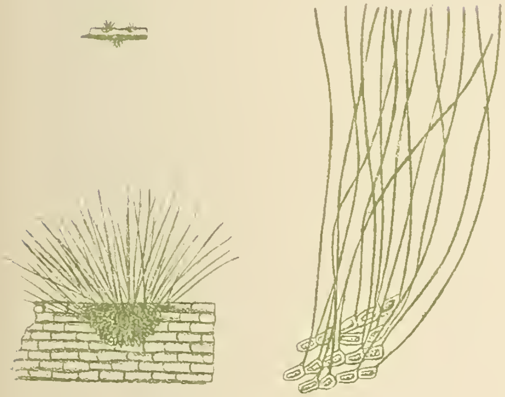
335.—Enteromorpha Hopkirkii, *M'c Calla.*



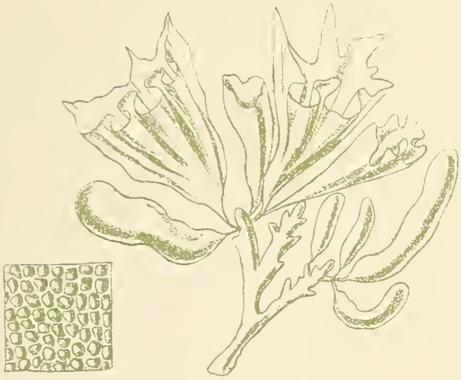
336.—Conferva sutoria, *Berk.*



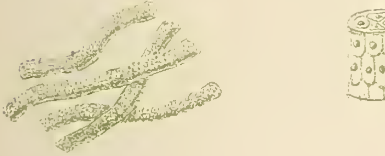
337.—Conferva Youngana, *Dillw.*



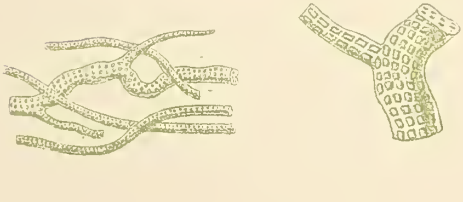
338.—Ochlochæte hystrix, *Thw.*



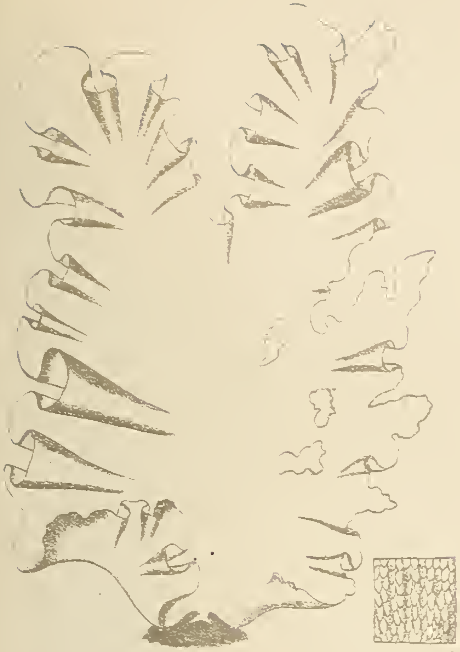
339.—Enteromorpha cornucopiæ, *Hook.*



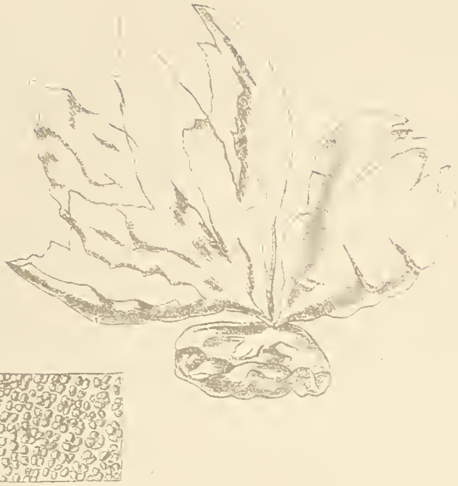
341.—Enteromorpha Ralfsii, *Harv.*



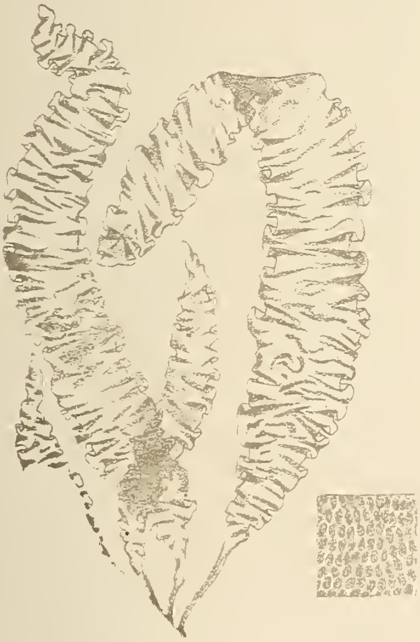
340.—Enteromorpha percursa, *Hook.*



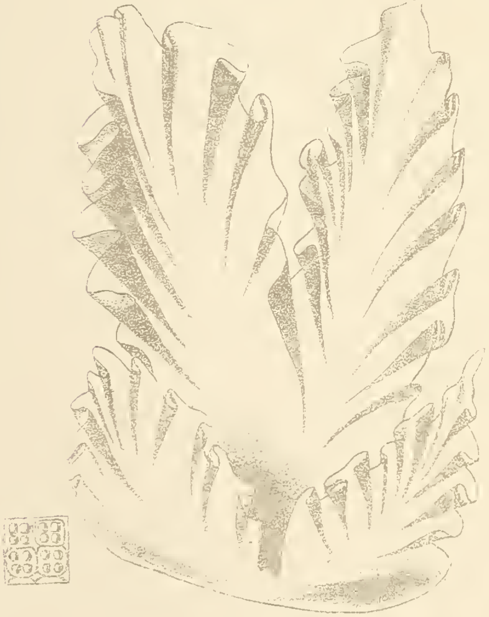
342.—Ulva latissima, *Linn.*



343.—Ulva lactuca, *Linn.*

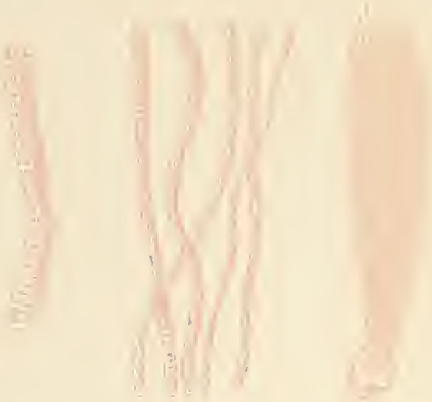


344.—Ulva linza, *Linn.*



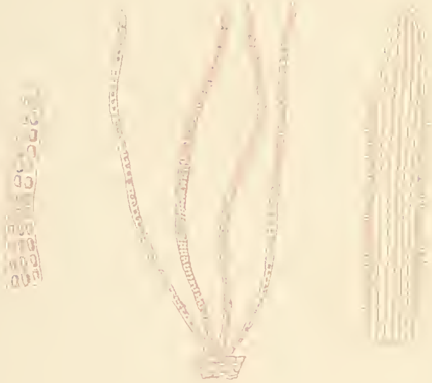
345.—Porphyra laciniata, *Ag.*

Plate LXXIV.

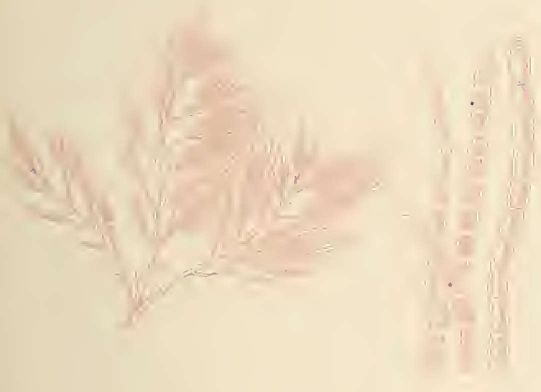


347.—Bangia fusco-purpurea, *Lynb.*

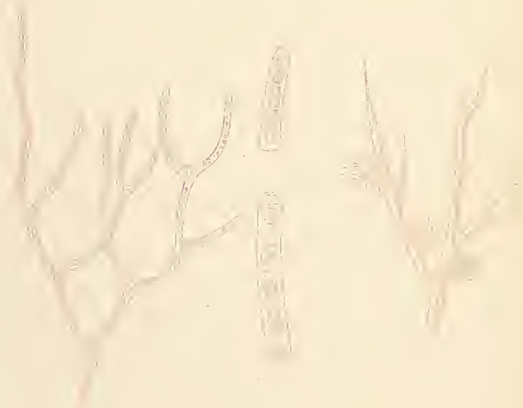
346.—Porphyra vulgaris, *Ag.*



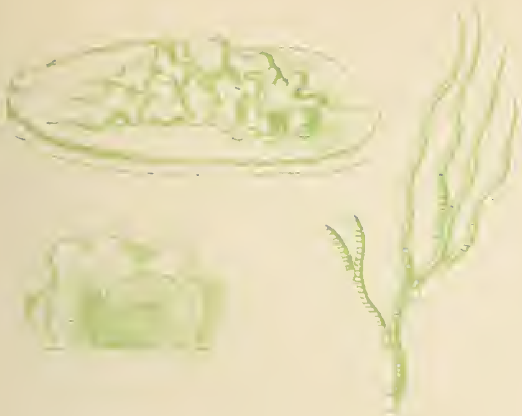
348.—Bangia ciliaris, *Carm.*



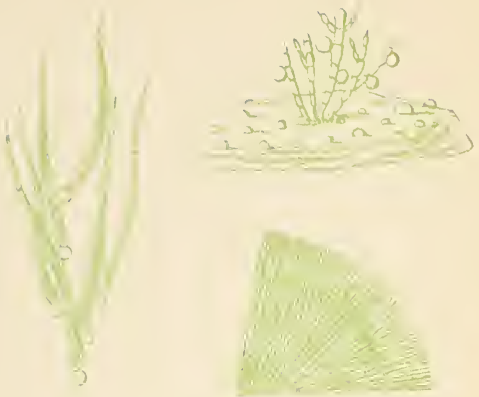
349.—Bangia ceramicola, *Chauv.*



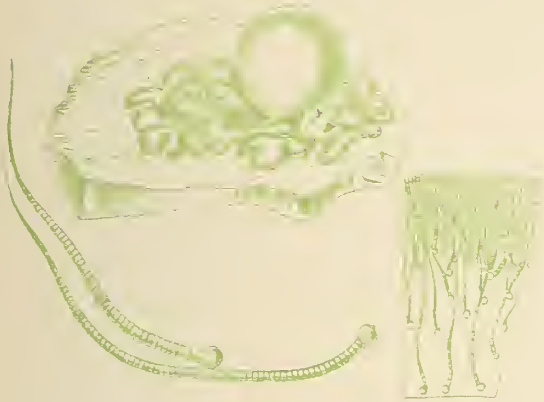
350.—Bangia elegans, *Chauv.*



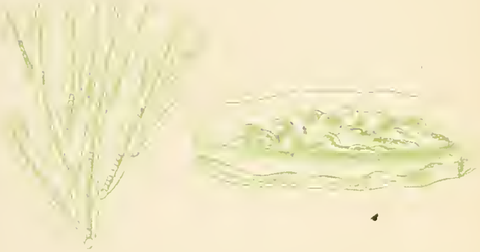
351.—Rivularia plicata, *Carm.*



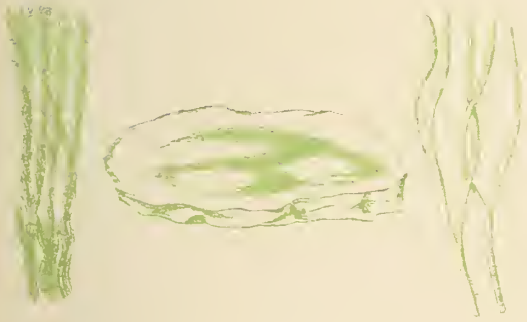
352.—Rivularia atra, *Roth.*



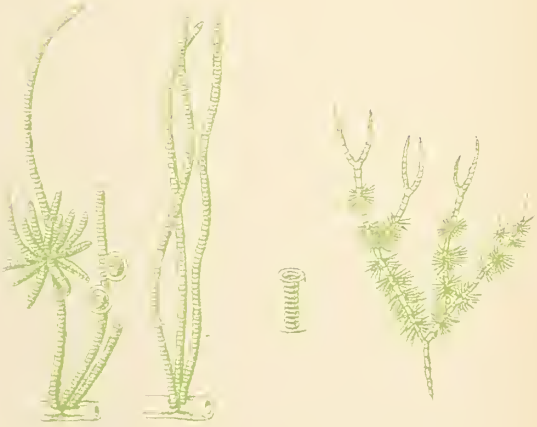
353.—Rivularia nitida, *Ag.*



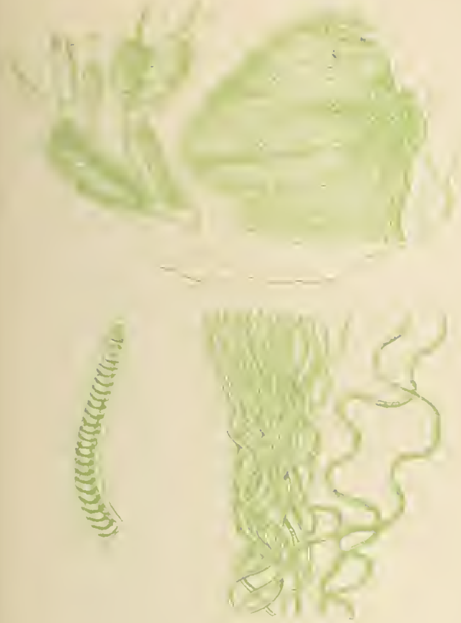
354.—Schizosiphon Warreniæ, *Casp.*



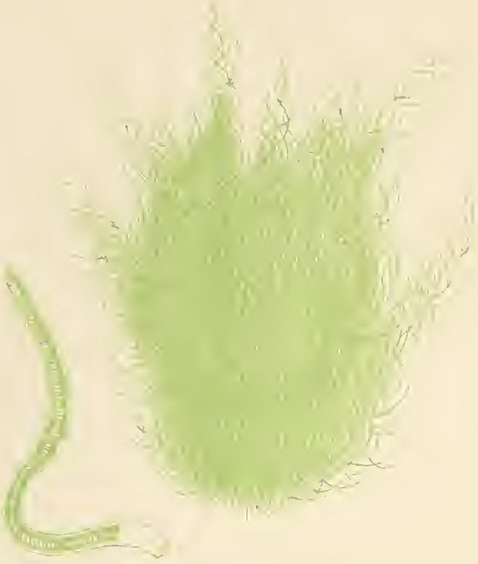
355.—Schizothrix Creswellii, *Harv.*



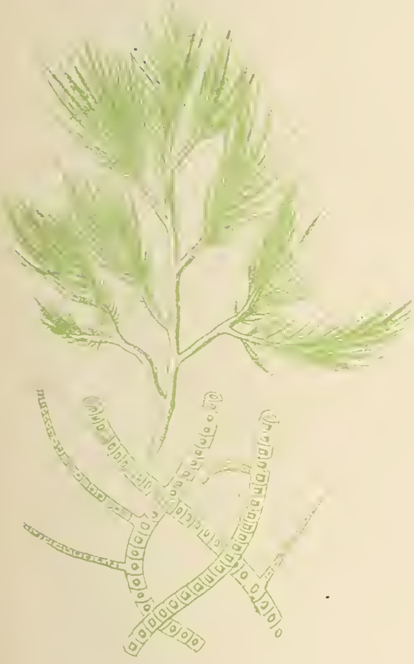
356.—Calothrix confervicola, *Ag.*



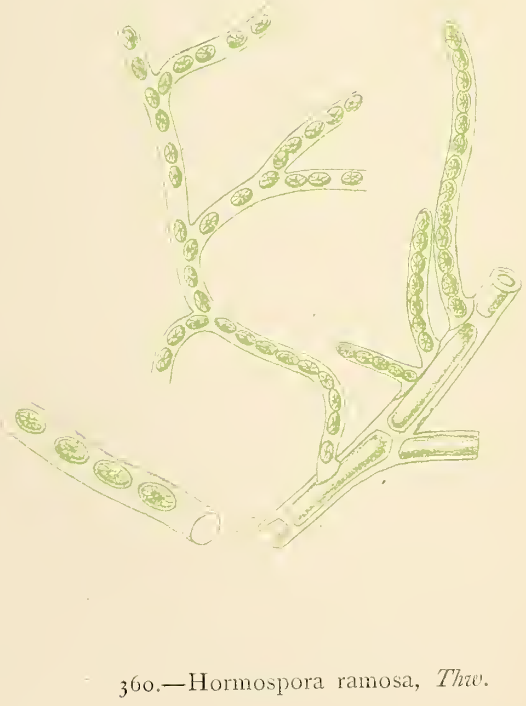
357.—Calothrix pannosa, *Harv.*



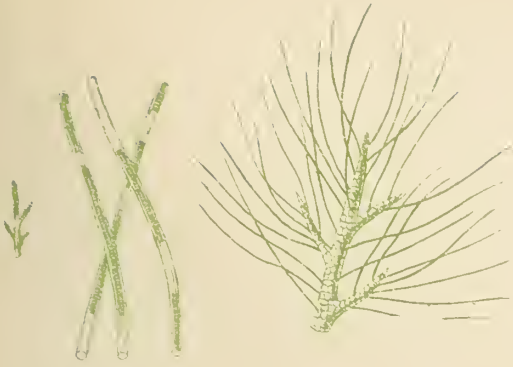
358.—Lyngbya majuscula, *Harv.*



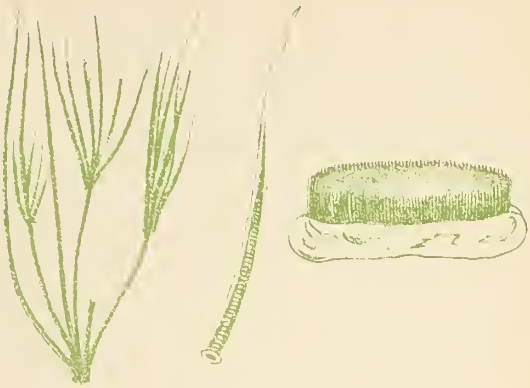
359.—Lyngbya flacca, *Harv.*



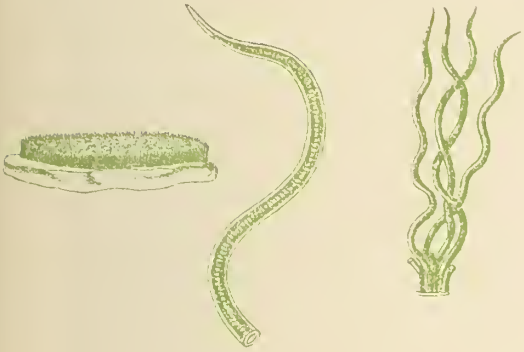
360.—Hormospora ramosa, *Thw.*



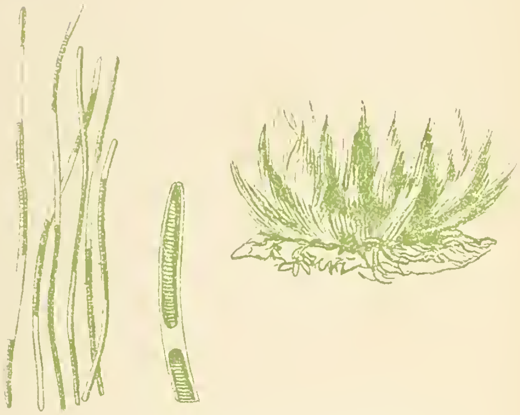
361.—Calothryx luteola, *Grev.*



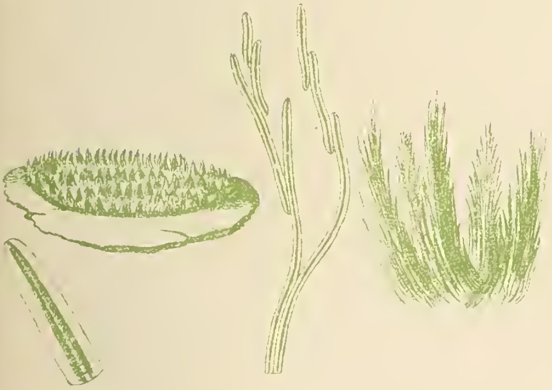
362.—Calothryx fasciculata, *Ag.*



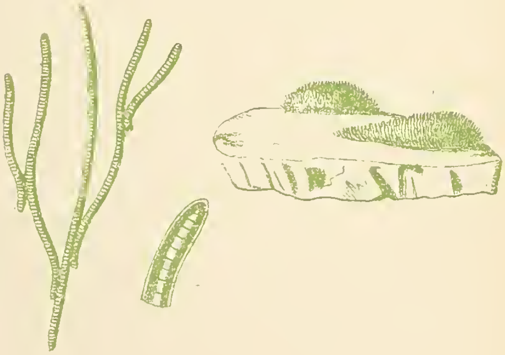
363.—Calothryx scopulorum, *Ag.*



364.—Calothryx semiplena, *Ag.*

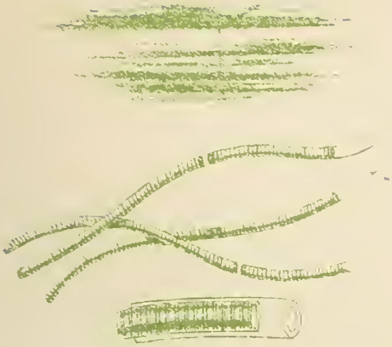


365.—Calothryx hydnoides, *Carm.*

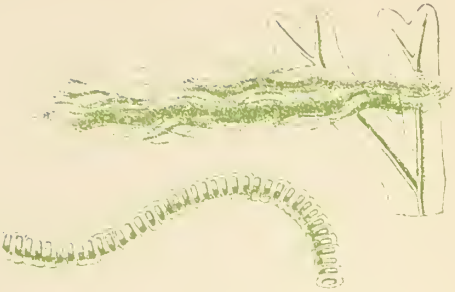


366.—Calothryx cæspitula, *Harv.*

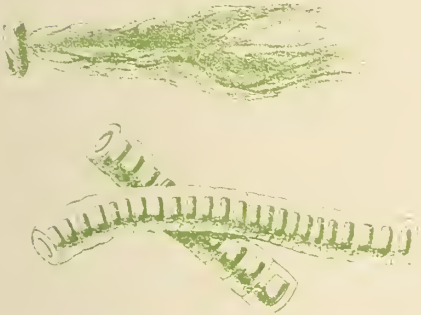
Plate LXXVIII.



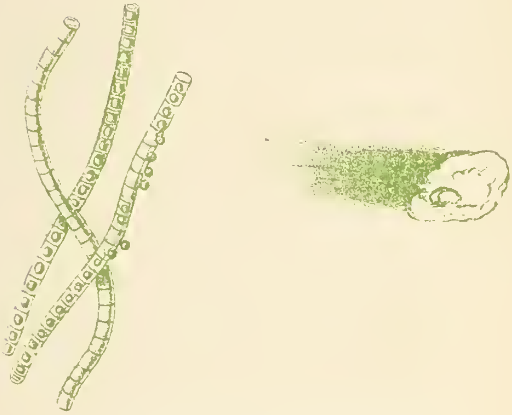
367.—Lyngbya ferruginea, *Ag.*



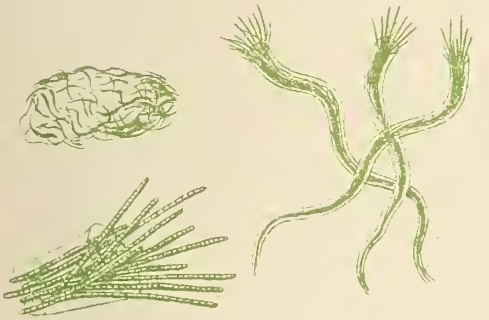
368.—Lyngbya Carmichaelii, *Harv.*



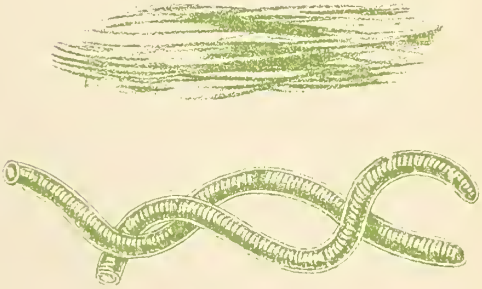
369.—Lyngbya speciosa, *Carm.*



370.—Lyngbya Cutleriæ, *Harv.*

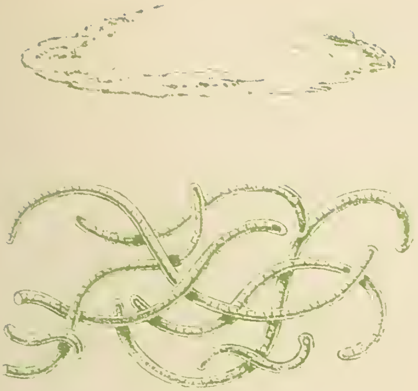


371.—Microcoleus anguiformis, *Harv.*

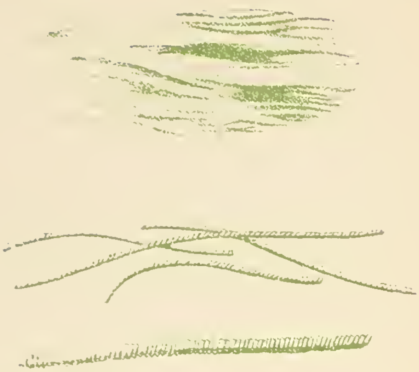


372.—Oscillatoria littoralis, *Carm.*

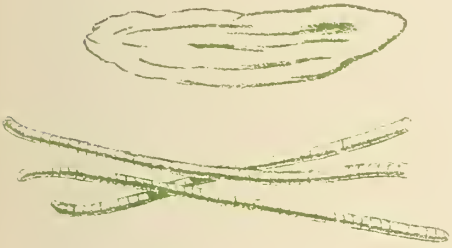
Plate LXXIX.



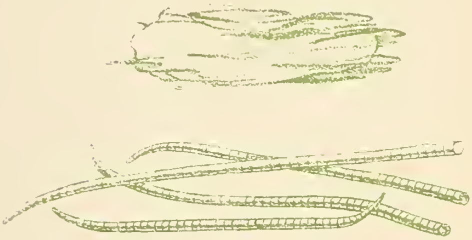
373.—Oscillatoria spiralis, *Carm.*



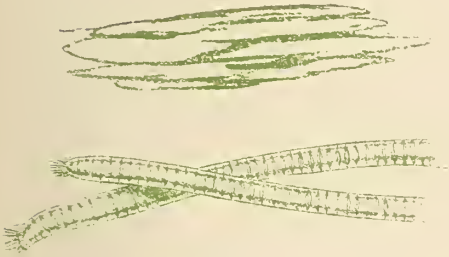
374.—Spirulina tenuissima, *Kütz.*



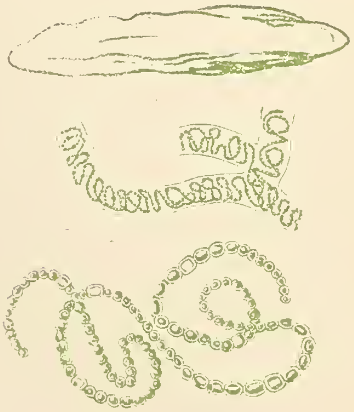
375.—Oscillatoria nigro-viridis.



376.—Oscillatoria subuliformis, *Thw.*

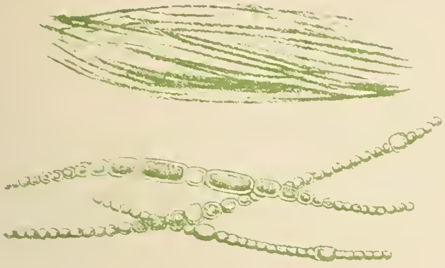


377.—Oscillatoria insignis, *Thw.*

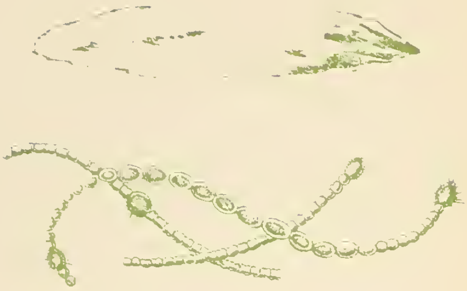


378.—Monormia intricata, *Berk.*

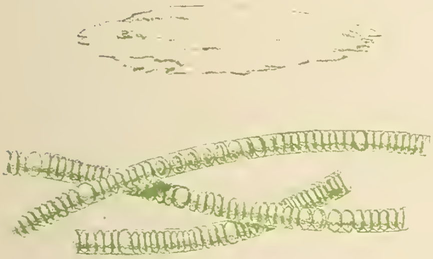
Plate LXXX.



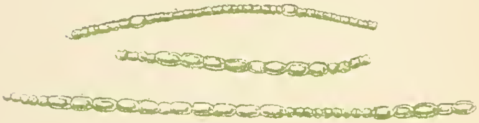
379.—Sphærozyga Carmichaelii, *Harv.*



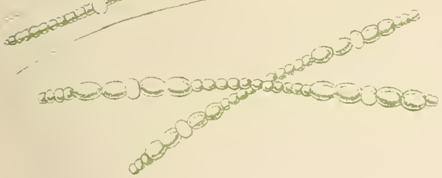
380.—Sphærozyga Thwaitesii, *Harv.*



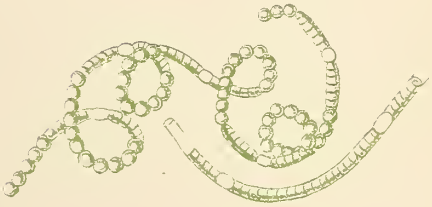
381.—Spermosira litorea, *Kütz.*



382.—Sphærozyga Broomei, *Thw.*



383.—Sphærozyga Berkeleyana, *Thw.*



384.—Spermosira Harveyana, *Thw.*